Drift composition and Surficial Geology, MacQuoid Lake area

(NTS 55 M/7 and 55 M/10),

Kivalliq region, Nunavut: a guide to drift prospecting

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OPEN FILE 3944

P.J. Henderson
Terrain Sciences Division, Geological Survey of Canada
2000

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Appendices 1-9a: data stored in Microsoft Excel 97 format

For more information
Contact: P. Henderson
Terrain Sciences Division, Geological Survey of Canada
601 Booth Street, Ottawa K1A 0E8
pehender@nrcan.gc.ca

Introduction

Commencing in 1998, surficial geology mapping at the 1:50 000 scale and drift sampling were conducted in the western part of the MacQuoid-Gibson greenstone belt (55M/7 and 55M/10), Kivalliq region, Nunavut (Fig. 1). This open file report presents the results of the compositional analyses of till and esker samples collected at a reconnaissance scale and provides an overview of the surficial geology as it applies to drift prospecting in the area. All data presented in the report is also provided on diskette.

The project is part of the Western Churchill NATMAP Program, a multidisciplinary study focused on geological and surficial geology mapping in areas of potential mineralization associated with greenstone belts. The goals of the program are two-fold: (1) to improve the understanding of the tectonic evolution of the Western Churchill Province and its role in the development and preservation of mineral deposits, and (2) to provide a framework for mineral exploration using tectonic and glacigenic models.

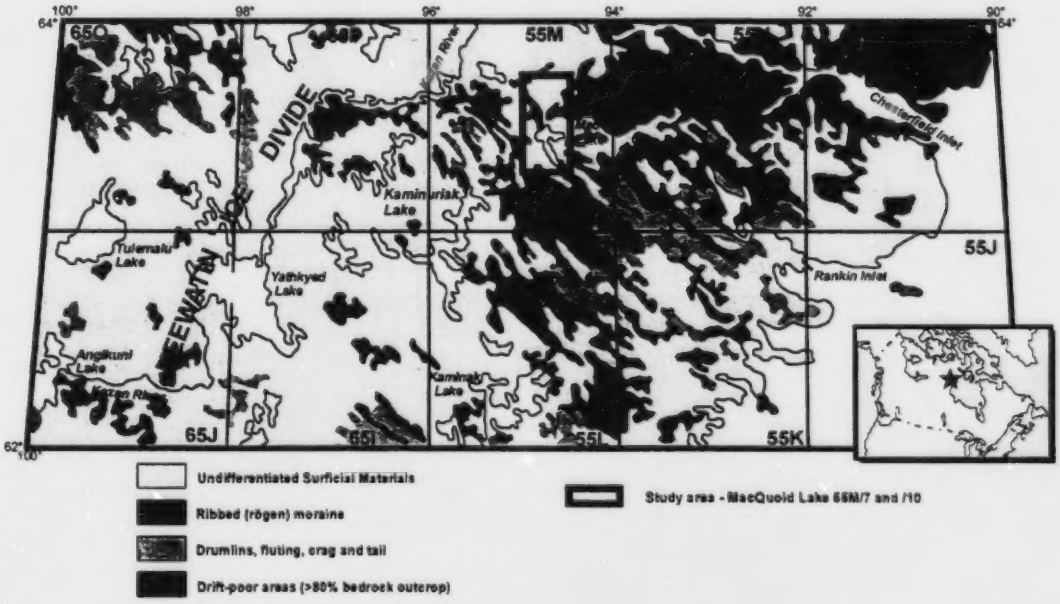


Figure 1: Western Churchill NATMAP area showing the location of the MacQuoid Lake study, Kivalliq region, Nunavut. Surficial geology simplified from Aylsworth and Shilts (1989).

The Quaternary geology component of the program is intended to aid mineral exploration by developing drift prospecting methods and strategies appropriate to the area. This includes: (1) the development of sampling methodologies, (2) the identification and distribution of chemical and mineralogical components of till associated with mineralization, (3) the establishment of a geochemical database as a means of determining background and threshold concentrations of those components, and (4) the establishment of a geological framework for interpreting geochemical, mineralogical and lithological dispersal patterns.

Rocks underlying part of the Western Churchill NATMAP project area (lat. 62° to 64°; long. 90° to 100°)(Fig. 1) are prospective for gold, uranium, diamond, and base metal mineralization. Conventional bedrock mapping is hampered in places by thick deposits of Quaternary sediment; consequently, drift prospecting is an essential exploration tool. The region lies near the centre of the area covered by the Late Wisconsin Laurentide Ice Sheet (Fulton, 1989), and straddles part of the Keewatin Ice Divide (KID), which is defined as the zone occupied by the last remnant of glacier ice (Lee, 1959). Surficial features in the region (eg. eskers, drumlins) form a distibution pattern that is roughly concentric about the KID (Aylsworth and Shilts, 1989). The generalized surficial sediment map for the NATMAP area is shown in Figure 1. Till is the dominant sediment type and occurs as ribbed (or Rögen) moraine, fluted and drumlinized terrain and till blankets of varying thickness. The composition of these glacial sediments is linked to the underlying bedrock in complex ways and, consequently, an understanding of the genesis of this surficial cover is fundamental to any mineral exploration program using drift prospecting techniques.

Physiographic Setting, Vegetation and Permafrost Characteristics

The MacQuoid Lake area (55M/7 and M/10) lies within the Kazan Upland physiographic region of Canada (Bostock, 1970). The terrane is rather featureless consisting of flat-lying to rolling plains with numerous lakes of varying size. Relief is low, rarely exceeding 60 to 90 meters, with highest elevations at approximately 185 m a.s.l. northwest of MacQuoid Lake. The land slopes gently southeasterly, toward Hudson Bay. The landscape is heavily drift covered in places, forming till plains which are locally fluted or drumlinized, areas of hummocky till and Rögen moraine. Esker systems with branches oriented N-S and SE-NW cut across the area and raised marine beaches occur below 135 m a.s.l.. The major lakes are elongated NW-SE, parallel to the last dominant regional ice flow direction. Small, isolated, rounded to irregularly shaped kettle lakes are also present locally.

The area lies north of the treeline and is covered by tundra vegetation, which includes mosses, sedges and lichen. The ground is permanently frozen and permafrost depths are estimated to exceed 300 m (Shilts, 1973) with the active layer varying between 0.15 and 2 m, depending on sediment type and local drainage conditions. Various periglacial features have developed on the land surface. These include: (1) frost boils (synonyms: mudboil, stony earth circle (Permafrost Subcommitte, 1988)) - a type of non-sorted circle formed by frost action, commonly on till or fine-grained sediments underlain by permafrost, (2) frost cracks (synonyms: ice crack, contraction crack, thermal contraction crack (Bates and Jackson, 1980, p. 248)) – a nearly vertical fracture developed by thermal contraction in frozen ground with appreciable ice content (eg. eskers). Frost cracks commonly intersect to form polygonal patterns in plan view, (3) striped ground - a form of patterned ground marked by alternating stripes of fine and coarse surficial material, or of rock or soil and vegetation-covered ground. Stripes (synonyms: nonsorted stripe; contraction stripe) commonly form in till and are produced on a sloping surface by solufluction acting in conjunction with other processes (Bates and Jackson, 1980, p. 618), and (4) felsenmeer – fields of blocks formed by the upward movement and fracturing of rock due to subsurface freezing of water and growth of ice masses.

Bedrock Geology

Regional compilation maps (scale 1: 1 000 000), which include the area of this study, have been published for the Maguse River area (NP-15/16)(Tella et al, 1997a). The maps include bedrock geology, mineral occurrences, regional metallogeny, and gravity and magnetic surveys. The Maguse River area includes the central part of the Churchill Province (Hearne) of the Canadian

Shield, which represents part of a reworked Archean cration lying between the Archean Slave and Superior cratons. Remnants of middle and late Paleoproterozoic clastic sediments lie unconformably on the Archean gneiss terranes, supracrustal belts and associated plutons. The MacQuoid-Gibson greenstone belt forms one of these supracrustal belts and occurs as a linear structural domain within the Archean craton. It is oriented NE-SW and extends approximately 150 km from an area 10-15 km SW of Chesterfield Inlet to Kaminuriak Lake, reaching a maximum thickness of approximately 25 km. The MacQuoid Lake study area (55M/7 and /10) lies within the western extent of this supracrustal belt.

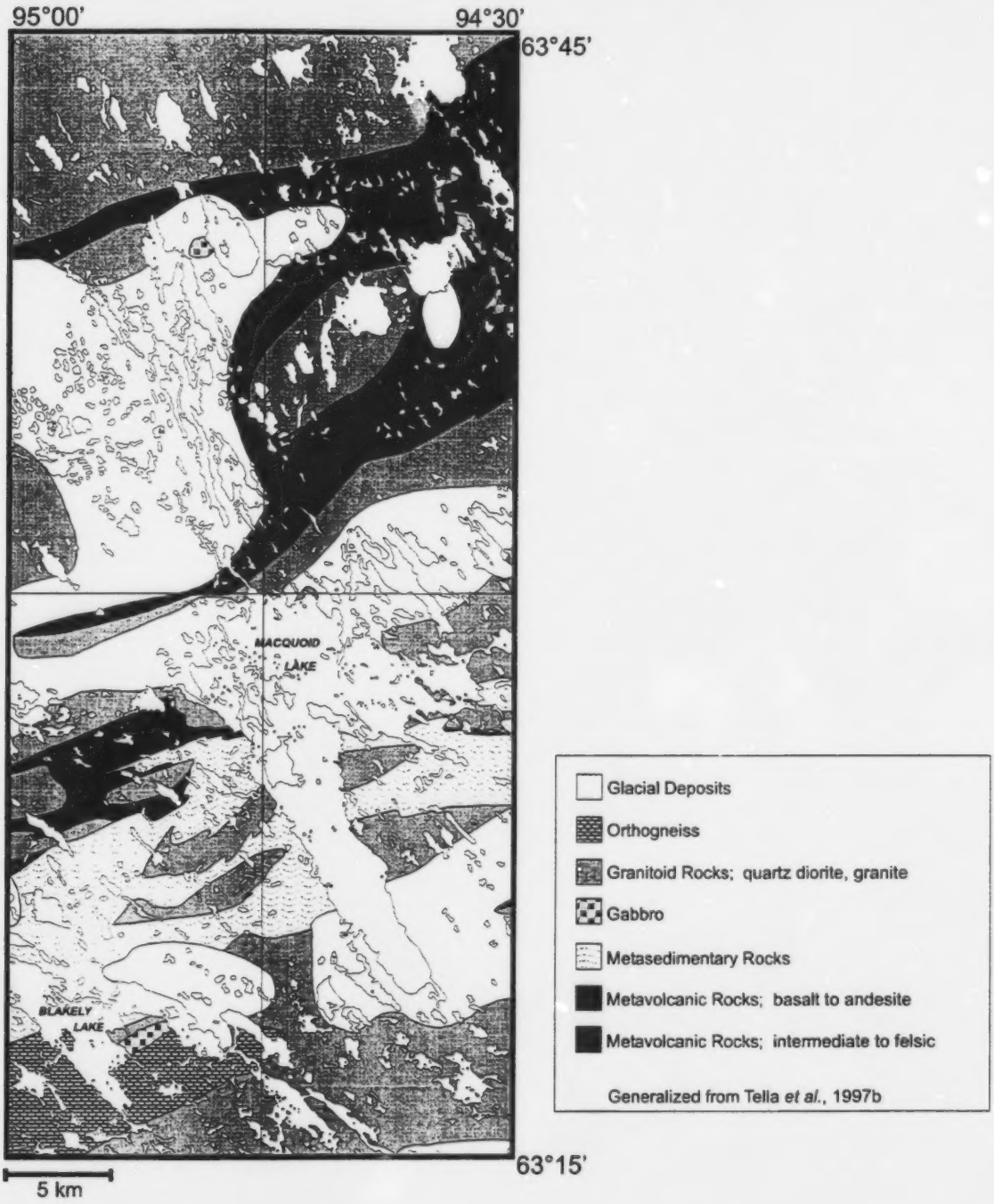
The bedrock geology of the MacQuoid Lake area (55M/7 and /10) has been mapped at the (1:50 000 scale)(Tella et al, 1997b)(Fig. 2). This early work is incorporated into the 1:100 000 scale regional compilation for the Western Churchill NATMAP project (Tella et al, 2000). Portions of the area had been mapped previously at a scale of one inch to eight miles (Wright, 1967) and 1:250 000 scale (Reinhardt and Chandler, 1973; Reinhardt et al, 1980). Specific aspects of bedrock mapping in the Thirty Mile (65P), MacQuoid Lake (55M) and Gibson Lake (55N) areas have been addressed by Armitage et al. (1995, 1997), LeCheminant et al. (1976, 1979), MacRae et al, (1995), Schau et al. (1982), Tella et al. (1989, 1993,), among others.

Bedrock geology in the MacQuoid Lake area (55M/7 and /10) comprises polydeformed and metamorphosed Archean supracrustal rocks composed of metavolcanic and metasedimentary rocks and layered quartzo-feldspathic gneisses of the MacQuoid-Gibson greenstone belt, intruded by late Archean granitoid complexes (Tella et al, 1997b)(Fig. 2). The metavolcanic rocks consist primarily of mafic to intermediate flows intercalated with volcaniclastic rocks, volcanic breccia and minor felsic units. Weakly to strongly foliated gabbroic intrusions are common within the mafic flows. Metasedimentary rocks include psammites, semipelites, pelites, and minor iron formation and polymictic conglomerate. The psammites and semipelites are compositionally banded; metamorphic minerals may include biotite, garnet, staurolite and sillimanite. The metasedimentary rocks occur as E-ENE striking linear belts and are infolded with the metavolcanic rocks. The steeply dipping strata encompass elliptical bodies of gneissic granodiorite and tonalite. Polydeformed, E to ENE trending metamorphosed diabase dykes and Paleoproterozoic granites intrude the Archean rocks. Lamprophyre, syenite and quartz-feldspar dykes transect the belts, trending SSE to SE. Dominant structural trends are ENE (Tella et al., 1997b).

West and northwest of the study area, essentially unmetamorphosed late Paleoproterozoic epicontinental sedimentary and volcanic rocks of the Dubawnt Supergroup outcrop (Wright, 1955; Donaldson, 1965; LeCheminant et al., 1979; Blake, 1980; Peterson et al., 1989; Gall et al., 1992; Rainbird and Peterson, 1990; Hadlari et al., 2000; Rainbird et al., 2000)(Fig. 3). These rocks are lithologically distinctive from the highly metamorphosed and deformed lithologies of the Archean terrane. Two basin systems have been recognized. The older, and more easterly, Baker Lake basin extends from the southern shore of Baker Lake to south of Dubawnt Lake. Four formations of the Baker Lake Group (Dubawnt Supergroup) are present. Polymictic conglomerate of the basal South Channel Formation rest unconformably on the Archean rocks. It is conformably and disconformably overlain by arkosic sandstone of the Kazan Formation. The overlying Christopher Island Formation is composed predominantly of ultrapotassic volcanic rocks and volcanogenic debris flows and breccia. The Kunwak Formation comprises a coarse redbed sequence that is conformable with the Christopher Island Formation, but locally directly overlies basement rocks. Intercalated grey, maroon and red rhyolite or dacite flows of the Pitz Formation, pyroclastic rocks, and minor sedimentary rocks form the Wharton Group and are separated from the Baker Lake Group by an angular unconformity. The Thelon Basin, contains

Figure 2: Bedrock Geology of the MacQuoid Lake Area (55M/7 and M/10)

(geology simplified from Tella *et al*, 1997b)



mainly flat-lying quartz-rich conglomerate and sandstone units, which include the Thelon Formation (Gall et al, 1992).

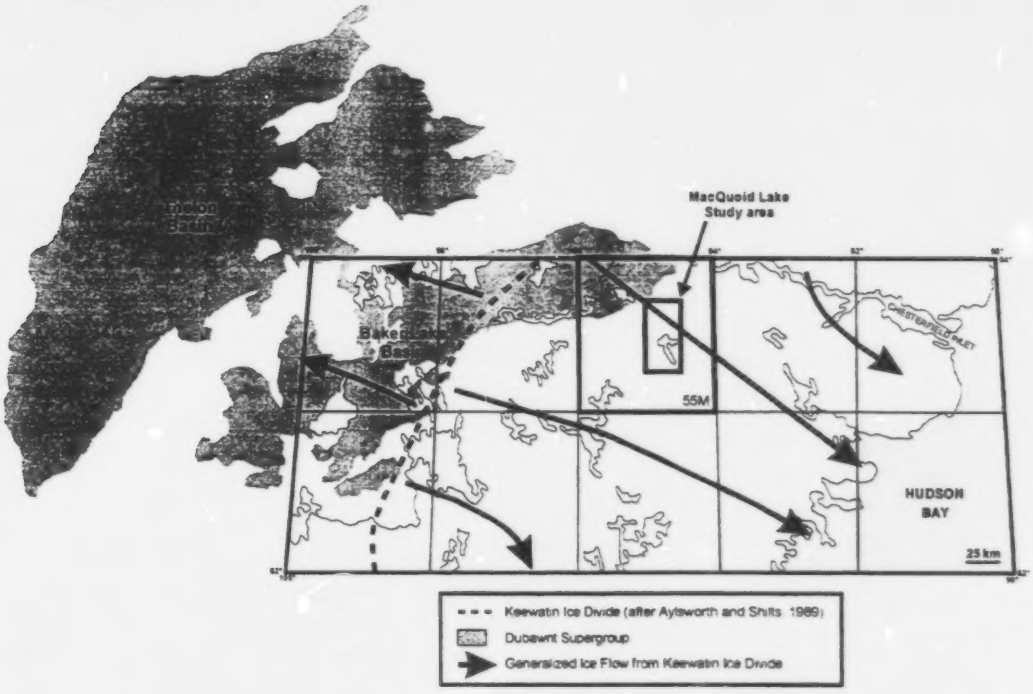


Figure 3: Regional perspective showing the relationship of the outcrop area of Dubawnt Supergroup rocks to the MacQuoid Lake study area. Arrows represent the main directions of ice flow from the Keewatin Ice Divide.

Mineralization

Mineral occurrences are abundant in the Archean supracrustal rocks and the Paleoproterozoic strata of the Baker Lake Basin. Archean deposit types include volcanic-hosted massive sulphide, lode gold in iron formation and volcanic-hosted sequences, and PGE, Cu, Ni in mafic and ultramafic rocks. Proterozoic deposit types include lode gold in supracrustal sequences, sediment hosted Cu and Ag, fracture-controlled uranium, diamonds associated with lamproite/lamprophyre volcanism, and unconformity-type uranium (Miller, 1980; Miller et al, 1986; Tella et al, 1997a; DiLabio and Knight, 1998).

The geology and economic potential of the MacQuoid-Gibson greenstone belt is summarized in Armitage (2000). Prospects investigated in the region include:

a) the Sandhill Zn-Cu-Pb-Ag deposit - volcanic-associated massive sulphide with stratabound mineralization occurring within hydrothermally altered rhyodacitic tuff (Armitage et al, 1995),
b) the Suluk Ni-Cu-Co occurrence – structurally controlled massive sulphide mineralization associated with a gabbro intrusion emplaced during Paleoproterozoic thermotectonism (Armitage et al., 1997)
c) the Falcon zone - iron formation hosted Au

d) the Akluilâk diamondiferous dyke – one of several unique diamond-bearing ultrapotassic lamprophyre dykes likely emplaced in the Paleoproterozoic (ca 1.84 Ga). Indicator minerals include foresteritic olivine, chrome spinel, garnet (G9), pyroxene (low chrome) and hornblende (MacRae et al., 1995).

The MacQuoid Lake study area (55M/7 and /10) is prospective for stratiform-type and vein gold deposits occurring within the metasedimentary and metavolcanic rocks of the Archean supracrustal belt. Several discontinuous gossan zones occur in siliceous metamorphosed iron formation associated with mafic metavolcanic rocks (Tella et al, 1997b). Sample locations and assay results from two samples in the study area are tabulated below with a summary of reported mineral occurrences taken from the NORMIN database (Northern Mineral Database) (Table 1)(Fig. 4).

Quaternary Geology

Historical Perspective

The Laurentide Ice Sheet covered most of northern North America during the last (Wisconsin) glaciation. Recent models for inception, growth and retreat of the ice sheet (Shilts, 1980; Andrews, 1987; Dyke and Prest, 1987) propose ice accumulation and flow out of upland areas west of Hudson Bay, Baffin Island, and Quebec-Labrador, which coalesced to form a large glacier complex. Ice remained longest in these same areas (Fulton, 1989). Details of ice sheet reconstructions are based on the pattern of ice flow features and the distribution of glacially dispersed debris. These data, although extensive, are largely undated and, consequently, there is much discussion on the flow dynamics of the Laurentide Ice Sheet. Part of the Quaternary studies associated with the Western Churchill NATMAP Program involve regional-scale systematic ice-flow-indicator mapping to improve the understanding of the glacial history of the Keewatin sector of the Laurentide Ice Sheet and to test existing models of its evolution and disintegration (McMartin and Henderson, 1999a).

Geological fieldwork undertaken in the Kivalliq region in the 1950's (Lord, 1953; Wright, 1955, 1967; Lee, 1959; Craig and Fyles, 1960) resulted in regional maps showing the distribution of surficial features and striation orientations. Based on this work, Lee et al (1957) recognized and defined the Keewatin Ice Divide as the zone occupied by the last remnant of glacier ice from the Laurentide Ice Sheet and the centre for the latest ice flow in the area (Lee, 1959)(Fig. 1). The Divide is characterized as a linear zone of hummocky terrane, which forms the locus of ice flow away from its axis. Aylsworth and Shilts (1989) recognized a zonal distribution pattern of landforms which is roughly concentric about the Keewatin Ice Divide. Lee (1959, p. 23) argues that these features were formed during the waning stages of glaciation and states that "there is no field evidence to indicate that the Keewatin Ice Divide was active during the initial and maximum stages of the Wisconsin glaciation". Conversely, Shilts et al (1979), Shilts (1980), and Aylsworth and Shilts (1989) concluded that ice flow from the Keewatin Ice Divide was maintained throughout one or more glacial stades of the Wisconsinan Stage, based on the distance of glacial transport and time constraints required to produce the dispersal trains. Aylsworth and Shilts (1989) allow that the dispersal centre migrated eastward and southward during its existence, but no more than 100 km, before stablizing in its final location at the KID. The presence of a divide located north and west of the position of the Keewatin Ice Divide was also postulated by Klassen (1995) to explain the composition of surficial deposits in the Baker Lake area. Dyke and Prest (1987), in their reconstructions of the Late Wisconsinan history of the Laurentide Ice Sheet, proposed an ice dome far (>400 km) to the west, near the East Arm of Great Slave Lake,

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Table 1: Mineral occurrences in MacQuoid Lake study area (NORMIN database, 1999)

Showing ID	Name	UTM			NTS	Mineralization Characteristics		Commodities	Development Stage	Rank	Lithology and Relationship	Commodity		
		Zone	Easting	Northing							Lithology 1	Mineral	Group	Subgroup
055MSE0001	MacQuoid Lake	15	409423	7035389	55M/7	Host: Iron Formation		Au	Reconnaissance	1 Showing, Bedrock	Iron Formation: Mineralized	Gold	Metal	Precious/Noble
055MNE0028	North Camp Shear	15	421127	7063752	55M/10	Host: Volcanic, Mafic	Structure: Shear	Au	Reconnaissance	1 Showing, Bedrock	Andesite: Mineralized	Gold	Metal	Precious/Noble
055MNE0029	Camp Iron Formation	15	423549	7057035	55M/10	Host: Iron Formation		Au	Local Examination	1 Showing, Bedrock	Iron Formation: Mineralized	Gold	Metal	Precious/Noble
055MNE0030	Camp Grid	15	423492	7056975	55M/10	Host: Volcanic, Mafic		Au	Local Examination	1 Showing, Bedrock	Amphibolite: Mineralized	Gold	Metal	Precious/Noble
055MNE0031	South Camp Iron Formation	15	423672	7056444	55M/10	Gossan; Host: Iron Formation		Au	Reconnaissance	1 Showing, Bedrock	Iron Formation: Mineralized	Gold	Metal	Precious/Noble
055MNE0032	Base	15	423208	7054350	55M/10	Gossan; Host: Iron Formation; Ore: Sulphide		Zn	Reconnaissance	2 Showing, Frostheave/Boulder	Iron Formation: Mineralized	Zinc	Metal	Base
055MNE0033	Pond	15	421426	7051947	55M/10	Host: Iron Formation	Structure: Stratabound	Au	Reconnaissance	2 Showing, Frostheave/Boulder	Iron Formation: Mineralized	Gold	Metal	Precious/Noble
055MNE0034	South Camp Shear	15	420030	7050743	55M/10	Gossan; Host: Volcanic, Mafic; Structure: Shear		Au	Reconnaissance	1 Showing, Bedrock	Amphibolite: Mineralized	Gold	Metal	Precious/Noble
055MNE0035	IF-1	15	414776	7046761	55M/10	Host: Iron Formation; Structure: Stratabound		Au	Reconnaissance	1 Showing, Bedrock	Iron Formation: Mineralized	Gold	Metal	Precious/Noble
055MNE0036	IF-2	15	414530	7046365	55M/10	Gossan; Host: Iron Formation		Au	Reconnaissance	1 Showing, Bedrock	Iron Formation: Mineralized	Gold	Metal	Precious/Noble
055MNE0037	IF-3	15	413982	7045513	55M/10	Gossan; Host: Iron Formation; Structure: Vein, Quartz		Au	Reconnaissance	2 Showing, Frostheave/Boulder	Iron Formation: Mineralized	Gold	Metal	Precious/Noble

Two grab samples of sulphide-bearing iron-formation have been analysed (see Tella *et al.*, 1997b). One assay indicates trace Au and anomalous Cu and Ni. SEM study of this sample (96TXS-155) revealed rare 5-10 micron grains of bismuth-bearing telluride and one 10 micron grain of (Au,Ag) electrum. Sample locations and assay results have been tabulated, the results are as follows:

	Easting	Northing	NTS	Au*	Ag	Zn	Cu	As	Co	Cr	Mn	S %
96LAAT070	404649	7020894	55M/7	7	0.3	146	157	<3	10	18	578	0.7
96TXS-155	413999	7062933	55M/10	31	0.5	131	550	<3	142	61	2030	15

*All values are in ppm except for Au [ppb]

Table 1: Mineral occurrences in MacQuoid Lake study area (NORMIN database, 1999)

Showing ID	Name	UTM			NTS	Mineralization Characteristics		Commo-dities	Development Stage	Rank	Lithology and Relationship	Commodity		
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055MSE0001	MacQuoid Lake	15	409423	7035389	55M/7	Host Iron Formation		Au	Reconnaissance	1 Showing, Bedrock	Iron Formation Mineralized	Gold	Metal	Precious/Noble
055MNE0028	North Camp Shear	15	421127	7063752	55M/10	Host Volcanic Mafic	Structure Shear	Au	Reconnaissance	1 Showing, Bedrock	Andesite Mineralized	Gold	Metal	Precious/Noble
055MNE0029	Camp Iron Formation	15	423549	7057035	55M/10	Host Iron Formation		Au	Local Examination	1 Showing, Bedrock	Iron Formation Mineralized	Gold	Metal	Precious/Noble
055MNE0030	Camp Grid	15	423492	7056975	55M/10	Host Volcanic Mafic		Au	Local Examination	1 Showing, Bedrock	Amphibolite Mineralized	Gold	Metal	Precious/Noble
055MNE0031	South Camp Iron Formation	15	423672	7056444	55M/10	Gossan Host Iron Formation		Au	Reconnaissance	1 Showing, Bedrock	Iron Formation Mineralized	Gold	Metal	Precious/Noble
055MNE0032	Base	15	423208	7054350	55M/10	Gossan Host Iron Formation Ore Sulphide		Zn	Reconnaissance	2 Showing Frostheave/Boulder	Iron Formation Mineralized	Zinc	Metal	Base
055MNE0033	Pond	15	421426	7051947	55M/10	Host Iron Formation	Structure Stratabound	Au	Reconnaissance	2 Showing Frostheave/Boulder	Iron Formation Mineralized	Gold	Metal	Precious/Noble
055MNE0034	South Camp Shear	15	420030	7050743	55M/10	Gossan Host Volcanic Mafic Structure Shear		Au	Reconnaissance	1 Showing, Bedrock	Amphibolite Mineralized	Gold	Metal	Precious/Noble
055MNE0035	IF-1	15	414776	7046761	55M/10	Host Iron Formation Structure Stratabound		Au	Reconnaissance	1 Showing, Bedrock	Iron Formation Mineralized	Gold	Metal	Precious/Noble
055MNE0036	IF-2	15	414530	7046365	55M/10	Gossan Host Iron Formation		Au	Reconnaissance	1 Showing, Bedrock	Iron Formation Mineralized	Gold	Metal	Precious/Noble
055MNE0037	IF-3	15	413982	7045513	55M/10	Gossan Host Iron Formation Structure Vein Quartz		Au	Reconnaissance	2 Showing Frostheave/Boulder	Iron Formation Mineralized	Gold	Metal	Precious/Noble

Two grab samples of sulphide-bearing iron formation have been analysed (see Tella *et al.*, 1997b). One assay indicates trace Au and anomalous Cu and Ni. SEM study of this sample (96TXS-155) revealed rare 5-10 micron grains of bismuth-bearing telluride and one 10 micron grain of (Au,Ag) electrum. Sample locations and assay results have been tabulated; the results are as follows:

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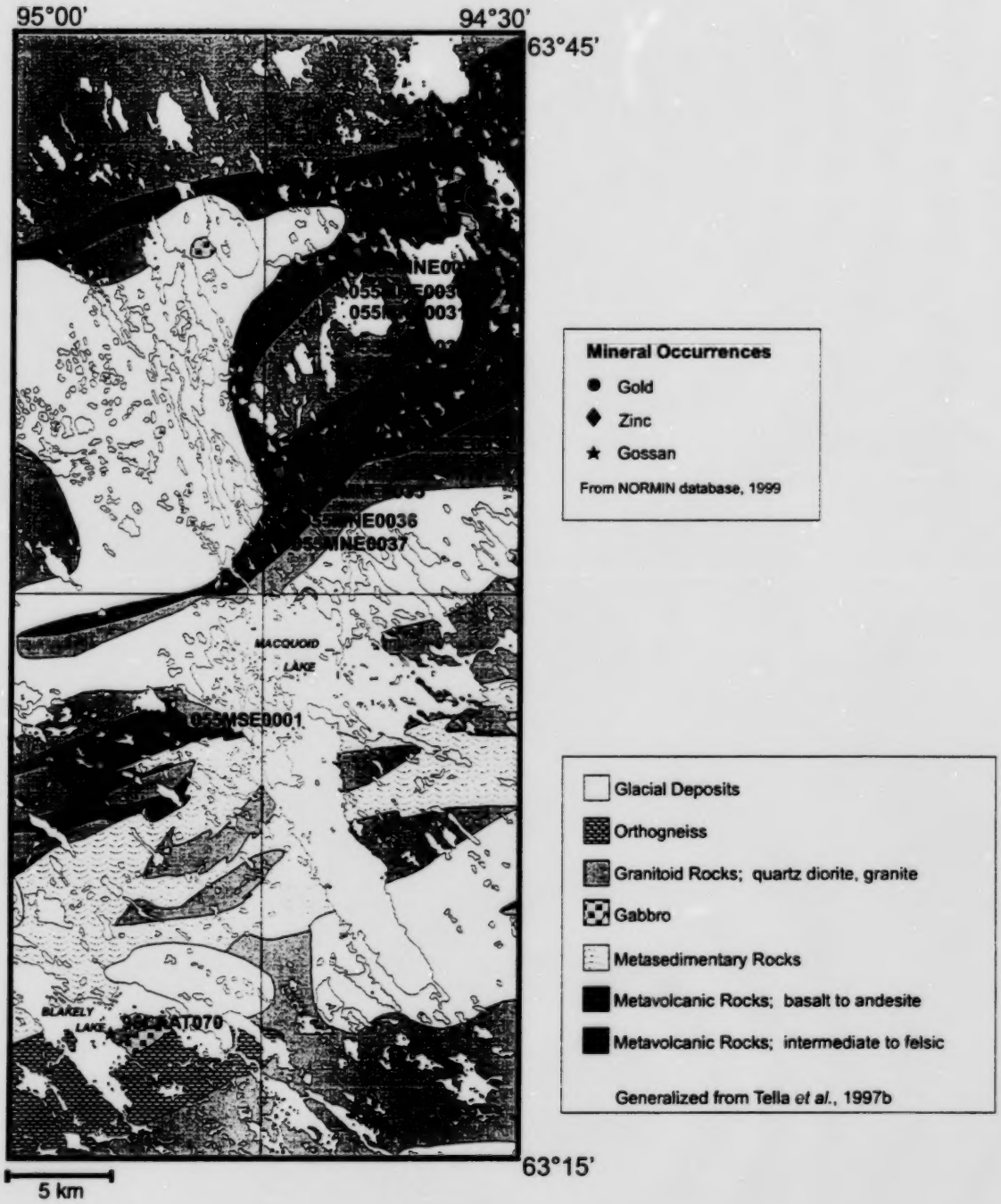
96TXS-155	413999	7062933	55M/10	31	0.5	131	550	<3	142	61	2030	15

***All values are in ppm except for Au [ppb]**

Figure 4: Mineral Occurrences in the MacQuoid Lake Area (55M/7 and M/10)



during the glacial maximum and named the associated ice divide, the Ancestral Keewatin Ice Divide. This ancestral divide migrated eastward through time and stabilized at the position of the KID. The debate continues. Differences in interpretation are fuelled by geologic and geographic considerations, such as the remoteness of the area, the lack of systematic mapping, and the complexity of the ice flow record near the ice divide, as evidenced from the multiple orientations and directions of ice flow indicators and the varied distances and directions of glacial transport.

Ice Flow Indicators

An understanding of ice flow history is fundamental to drift prospecting in order to resolve sediment transport directions and interpret dispersal patterns observed in the compositional analyses of glacial deposits. The determination of ice flow is based primarily on the measurement of the orientation of glacial striae and grooves. Where possible, the trend is also determined from crag and tail relationships of various scales, crescentic gouges, chattermarks and roches moutonnées. Relative ages are based on crosscutting striae or faceted outcrops with older striae preserved on protected surfaces (Lundqvist, 1990). The degree of preservation of striations on bedrock surfaces, and hence the ice flow record, is also a function of lithology. Preservation is excellent on fine-grained rocks, such as mafic volcanics and less so on granitoid rocks, gneisses and other coarser grained lithologies. A regional compilation of ice flow indicators for part of the NATMAP area, including the MacQuoid Lake area (NTS 55M), is given in McMartin and Henderson (1999a).

The MacQuoid Lake area is situated near the axis of the Keewatin Ice Divide and the ice flow record is complex (McMartin and Henderson, 1999b)(Fig. 5). Multiple directions of ice flow indicators were measured preferentially on flat-lying surfaces of clean shoreline outcops throughout the region. The oldest direction indicates ice flow to the southwest, the second oldest to the south and the third oldest to the east-southeast. This sequence suggests a counterclockwise shift in ice flow from a centre north and northwest of the NATMAP area. In some parts of the region, particularly the Ferguson Lake (NTS 65I) and Thirty Mile Lake (NTS 65P) areas, a record of north to northwestward ice flow has been preserved (Tyrrell, 1897; Lord, 1953; Coker et al, 1992) which predates the youngest and dominant regional southeasterly flow from the Keewatin Ice Divide (Fig. 5). This suggests that the centre of outflow was over a hundred kilometers to the east before migrating west to the position of the KID and indicates the dynamic nature of the ice sheet.

A summary of all ice-flow data for the study area (55M/7 and 55M/10) is presented in Appendix 1 (Fig. 6). The record of southeasterly ice flow from the KID dominates and is preserved in striae, flutes and crag-and-tail features. Evidence for the older southerly and southeasterly flow is indicated by poorly defined striae at several sites in the southern half of the map area. A younger, southerly ice flow direction has been interpreted from striae relationships in the northern part of the MacQuoid Lake area (Fig. 6). The record of this late flow is less regionally extensive than earlier ones and indicates ice flow from a more northerly dispersal center, likely associated with the KID. At one site near the southern margin of the map area, striae younger than the main southeast regional set are found adjacent to a major esker system. These striae are oblique to the esker orientation and suggest lateral reorientation of ice toward the esker ridge (Repo, 1954). Similar observations have been well documented in the Rankin Inlet area (McMartin and Henderson, 1999a)

A record of northerly (322°) ice flow was observed at one location on the western edge of the MacQuoid Lake map sheet (NTS 55M), but not within the study area itself. This lack of observations may not mean that northward flow did not affect the area, since preservation tends to

be poor on the outcropping, highly metamorphosed, rock. Indicators of the northerly flow may also be obliterated by those of the opposing and younger southeasterly flow from the KID.

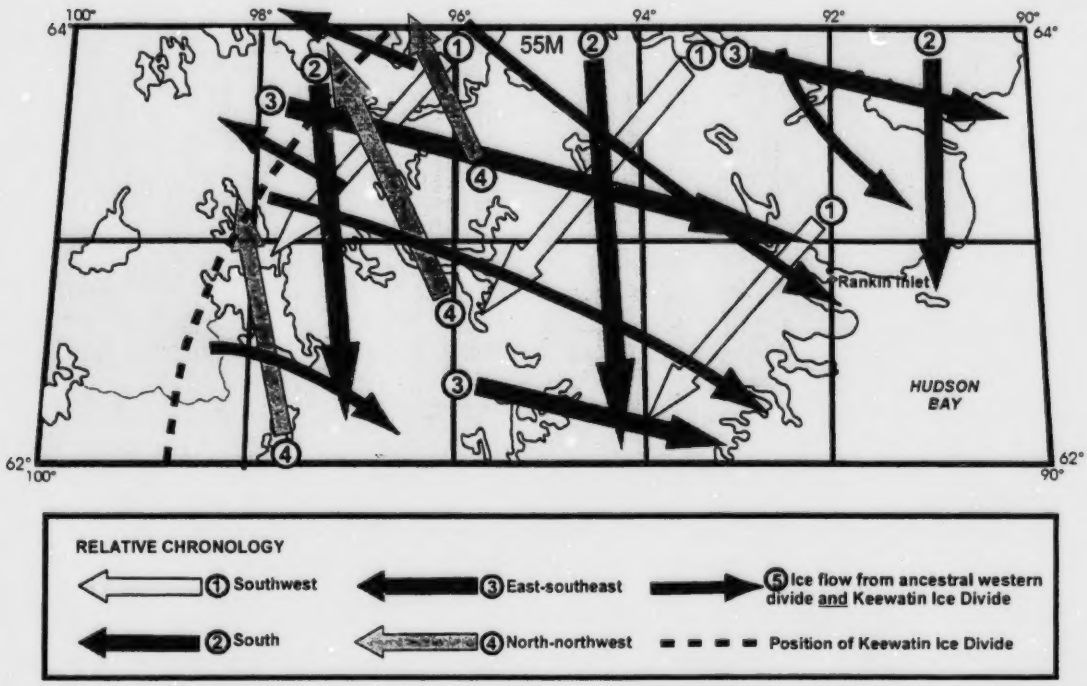


Figure 5: Generalized regional ice flow compilation (from McMartin and Henderson, 1999b).

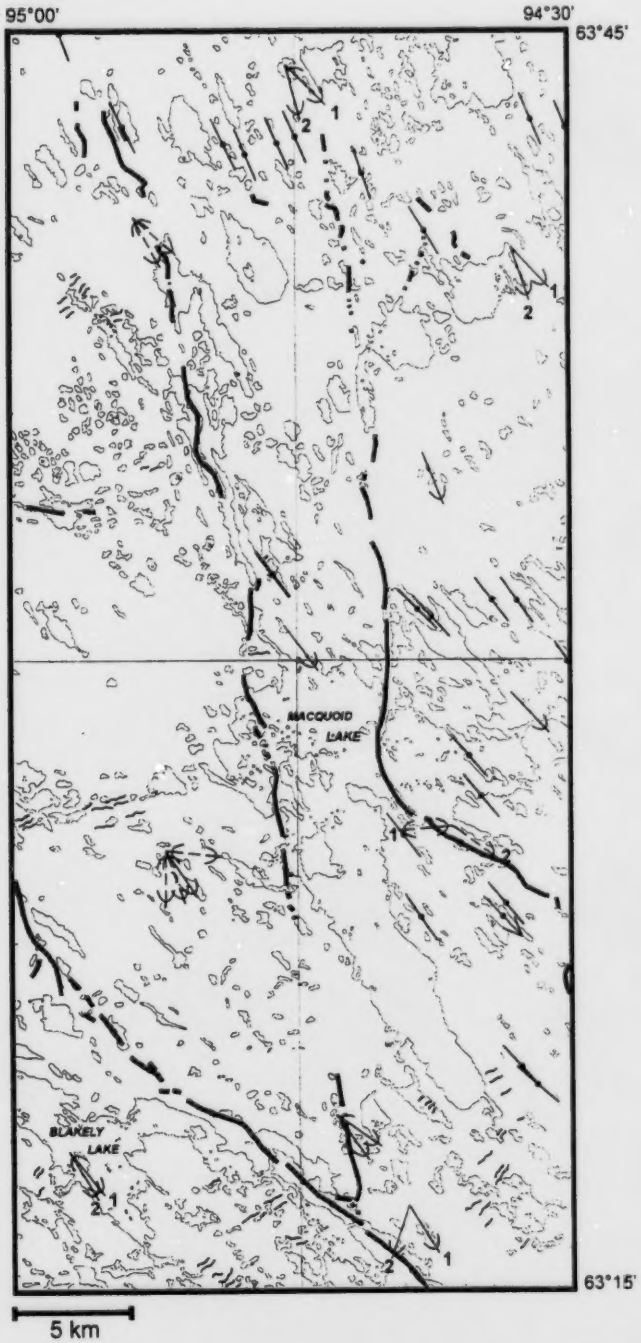
Quaternary Deposits

The surficial geology of the MacQuoid Lake area (55M) has been mapped by Aylsworth et al (1981)(1:125 000 scale), based primarily on air photo interpretation. Aylsworth and Shilts (1989) published a regional compilation of the distribution of glacial deposits and landforms for the Arctic mainland west of Hudson Bay (Districts of Mackenzie and Keewatin)(1: 1 000 000 scale). Within the study area, till is the most widespread surficial deposit (Fig. 7). Extensive esker systems are also present. Locally, glacial and glaciofluvial sediments have been reworked to varying degrees by nearshore marine processes associated with the Tyrrell Sea, which fronted the retreating ice margin and inundated the area during deglaciation. Below marine limit, fine-grained deep-water deposits occur in low-lying areas along with younger alluvial sediment deposited as slope wash or by modern fluvial processes.

Till

Till is characteristically a brown to reddish brown sandy diamicton averaging 58% sand, 38% silt and 4% clay. Deposits are most extensive and, presumably, thickest in the western and southern part of the study area where they occur as till plains, striped till, and Rögen moraine. Minor areas of hummocky moraine have also been mapped (Fig. 7). Ribbed or Rögen moraine forms straight

Figure 6: Ice Flow Indicators
MacQuoid Lake Area (55M/7 and M/10)



Glacial striae, well defined, direction known

Glacial striae, poorly defined, direction unknown

Multiple striae, relative age; 1 = oldest

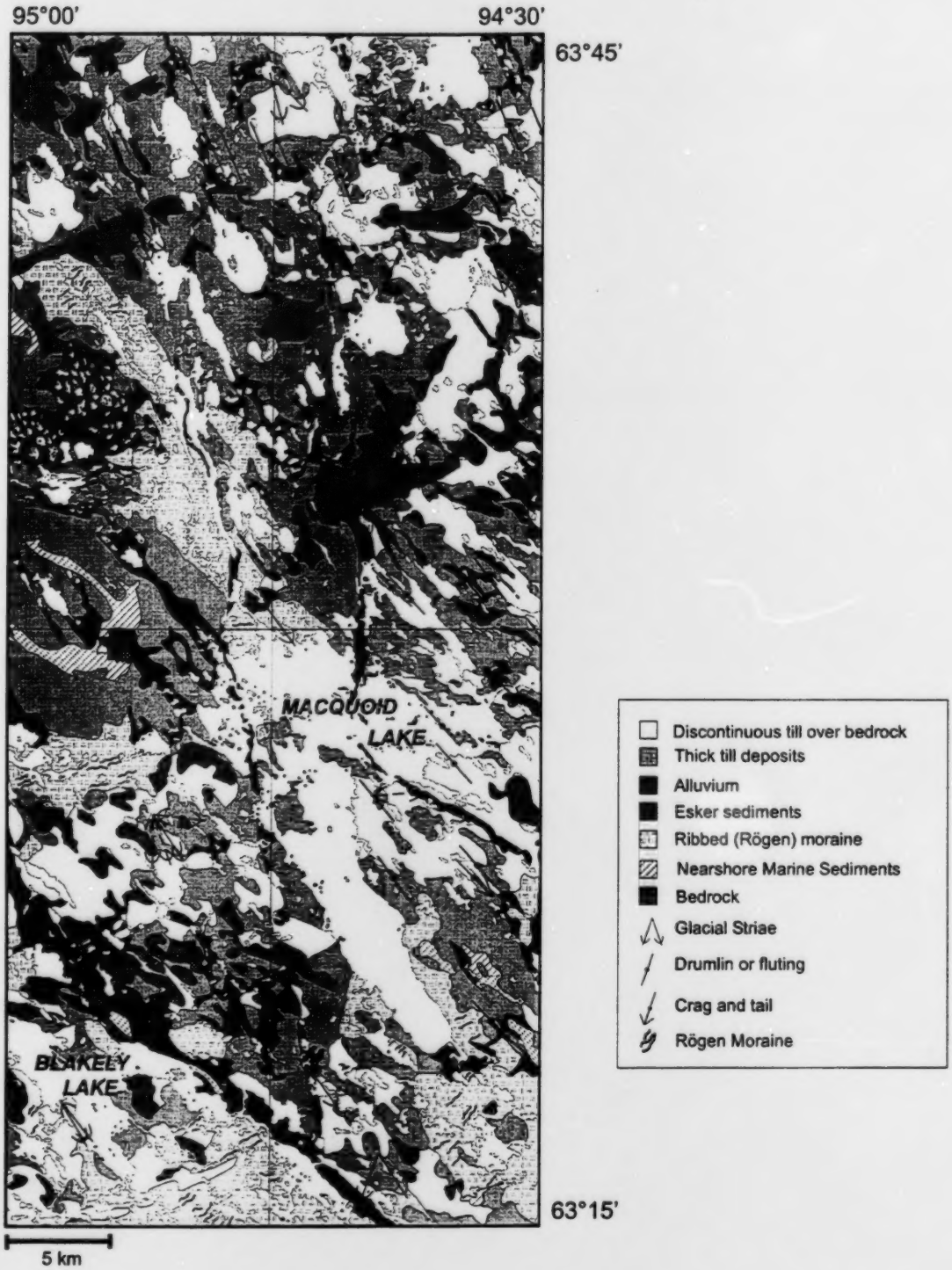
Drumlin or fluting

Crag and tail

Rögen Moraine - orientation of ridges shown

Esker

Figure 7: Surficial Geology
MacQuoid Lake Area (55M/7 and M/10)



(After Aylsworth *et al.*, 1981)

to sinuous ridges oriented perpendicular to the dominant ice flow direction. In these areas, till tends to be bouldery and the till ridges are mantled by boulders. Although the surface morphology of the deposits may vary, the physical characteristics of the matrix, such as texture and colour, appear comparable. Vegetation on till surfaces includes grasses, mosses and shrubs. Mud boils are present.

Glaciofluvial Deposits
West of Hudson Bay to the western margin of the Canadian Shield between latitudes 60° and 68°, esker systems form a pattern radiating outward from the Keewatin Ice Divide (Aylsworth and Shilts, 1989; pg. 17). The eskers are composed of sand and gravel deposited near the ice margin by water flowing in tunnels or ice-walled channels within the glacier. Individual esker systems exhibit a dendritic drainage pattern consisting of a trunk esker and associated bifurcating tributaries, which indicates flow away from the Keewatin Ice Divide. The eskers form relatively continuous deposits. Where breaks in deposition occur, esker segments are connected by outwash or areas of bare bedrock. Esker systems can be traced as far as 250 km east of the KID.

In the study area, eskers form sinuous ridges essentially oriented in two main directions: N-S and NW-SE (Fig. 7). The southeasterly flowing esker is the trunk of a large esker system extending from the KID to Hudson Bay; the southerly flowing segments are tributaries to this main system. Because the eskers are below marine limit, the relief on the features is subdued such that they rarely project over 10 m above the surrounding terrane. Stony or sandy beach deposits are common on esker surfaces. Esker surfaces are sparsely vegetated and characterized by orthogonal frost polygons.

Marine Sediments
The area was largely covered by the Tyrrell Sea. Regionally, the marine limit is 170 m. a.s.l. (Prest et al., 1968), although it may be lower within large lake basins, varying between 100 and 150 m a.s.l. (Klassen, 1995). Marine deposits in the area consist of fine-grained offshore sediment and glacial deposits modified by nearshore marine processes.

In the MacQuoid Lake study area, the marine limit is 160 m. a.s.l. Nearshore marine sediment, consisting of well-sorted sand or gravel, is present as beaches, bars and spits formed on till and esker surfaces. Marine reworking, to varying degrees, is present at all elevations below marine limit and fine-grained sand and silt is present locally in topographic depressions. These fine-grained deposits consist of modern alluvium mixed with silt and sand washed from slopes by wave action or deposited into the sea by glacial meltwater. The surface is flat and generally covered by >40 cm of peat with a cover of mosses, sedges and grass. Thaw ponds and frost polygons related to ice wedges are present and extend to a depth of 2-3 m (Alysworth et al, 1981).

Drift Composition

Previous work

In the 1970's, a major program was undertaken in the Kivalliq region, Nunavut by the Geological Survey of Canada to establish methods for drift prospecting based on a comprehensive Quaternary geological framework (Shilts, 1971a, 1971b, 1973, 1977; Ridler and Shilts, 1974). Initially the work was focused in the Kaminak Lake area, but later was broadened to include much of the Kivalliq region between the Manitoba border and latitude 66°N. One of the most significant results of the study was the recognition and documentation of the Dubawnt dispersal train (Fig. 8)(Shilts et al, 1979; Kaszycki and Shilts, 1980). A dispersal pattern was mapped in till based on the relative proportion of granules derived from rocks of the Dubawnt Supergroup.

These rocks outcrop in the Baker Lake area, west of the present study area, and are composed of relatively easily eroded sedimentary and volcanic lithologies that are distinctive, both in colour and composition, compared to the highly metamorphosed and deformed lithologies of the adjacent Archean terrane. The dispersal train extends over 300 km SE from the bedrock source, parallel to the dominant ice flow direction. Till in the central part of this dispersal train is characteristically red.

Figure 8: Dubawnt dispersal train (from Kaszycki and Shilts, 1980). The relative proportion of Dubawnt-derived debris in the granule fraction of till exceeds 50% by weight in part of the MacQuoid Lake area (NTS 55M).

In the late 1970's, a detailed study (1 sample/2-3 km^2) was undertaken in an area near Baker Lake that encompassed both outcrop of Dubawnt Supergroup rocks and the axis of the Keewatin Ice Divide (Klassen and Burns, 1986; Klassen, 1995; Klassen and Knight, 1996). The objectives of this study were to examine drift composition and glacial dispersal in the context of the distinctive geological terrain and complex ice flow associated with the major ice divide in an area of uranium mineralization. Because the study area lies directly north and west of the present study, data from Klassen and Knight (1996) combined with data from this report will provide a geochemical context for interpreting geochemistry changes in till related to ice flow from the Proterozoic to the Archean terrane.

In the MacQuoid Lake area, till contains a high proportion of Dubawnt-derived material, with Dubawnt clasts comprising up to 50% volume by weight of the total granule fraction. It has been shown that tills enriched in Dubawnt erratics are depleted in most trace and major elements (Shilts, 1984). As a result, Dubawnt-derived tills tend to mask the geochemical signature of the underlying granite/greenstone terrane of the MacQuoid-Gibson greeenstone belt. In fact, till geochemistry in the area is characterized by concentrations much lower than those of tills overlying greenstone belts in more southerly areas of the Canadian Shield (Henderson, 1994; 1995).

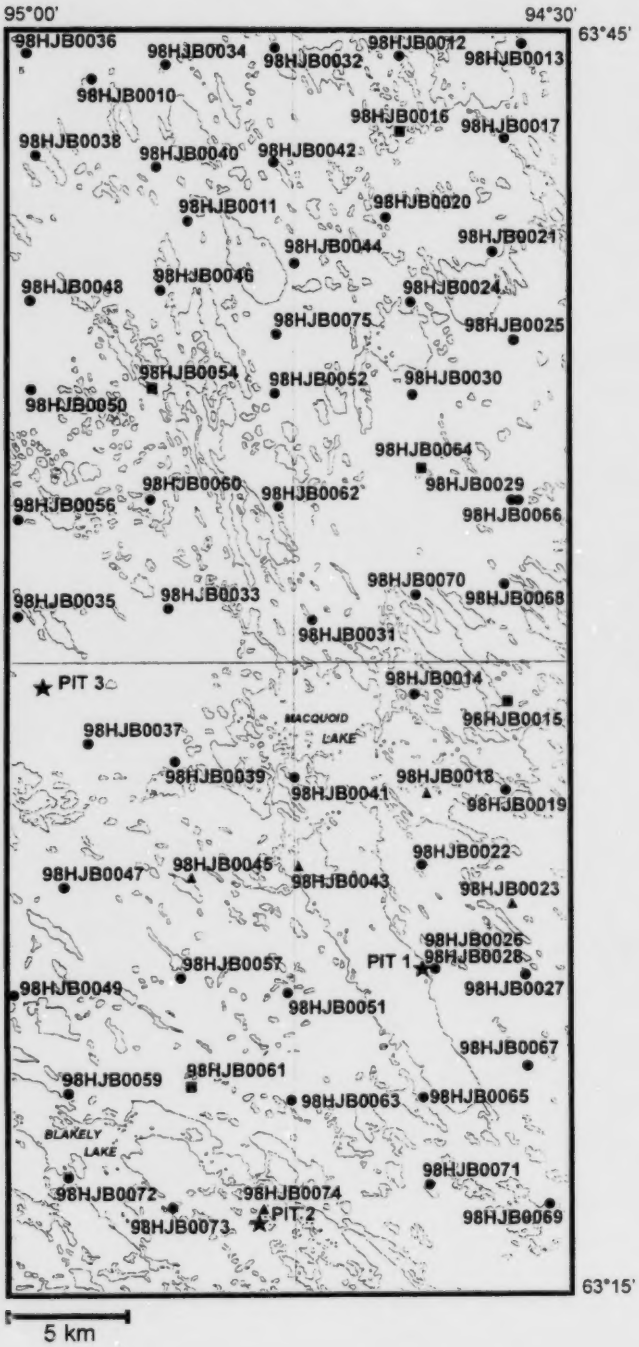
Field Procedures

Fieldwork was conducted during the summers of 1998 and 1999 from base camps organized by the Continental Geoscience Division of the Geological Survey of Canada. All sediment samples were collected in mudboils (Hornbrook and Allan, 1970; Shilts, 1978). In the tundra, these features develop in till or glaciomarine sediment and appear as circular to elongate bare patches, approximately 1m diameter, with a stony rim. They are easily recognized from a helicopter. Mudboils are periglacial features formed when saturated sediment of the active layer of permafrost is confined between permanently frozen sediment below and the rigid surface layer above. Pressures in the hydraulic system cause the saturated sediment to be extruded to the surface in a diapiric fashion through points of weakness in the upper rigid layer (Shilts, 1973; 1978). The mudboil consists of a central core composed of the thawed substrate and a rigid surface "carapace" which is derived from the underlying sediment, but is coarser grained due to the removal of fines by surface run-off.

Within the study area, 63 sediment samples (till and glaciomarine sand) were collected at a spacing of 1 sample/4-5 km^2 (Fig. 9)(Appendix 2). This sample density was chosen as a compromise between the need to provide regional coverage, identify dispersal trains associated with the Archean greenstone belt and potential mineralization, and fiscal constraints imposed by helicopter sampling. Three soil profiles were also sampled in mudboils at sites representative of different sediment types to characterize internal structures and compositional variation (Fig. 9)(Appendix 2). In addition, sand and gravel was collected at 15 sites from reworked esker deposits (Fig. 10)(Appendix 3).

Included in this report are 9 sediment samples (98HJB0001 – 0009) collected outside the map area, but within NTS 55M (MacQuoid Lake). Six of these samples were collected as part of NW-SE transects (parallel to the dominant iceflow direction) through the Proterozoic and Archean terrane and three samples were collected in an area of gold mineralization, the Falcon zone (Appendix 2). Although data is presented for these samples, the sites are not located within the designated area for the open file (55M/7 and M/10) and, consequently, analytical results will not be discussed or plotted.

Figure 9: Sediment Sample Locations
MacQuoid Lake Area (55M/7 and M/10)

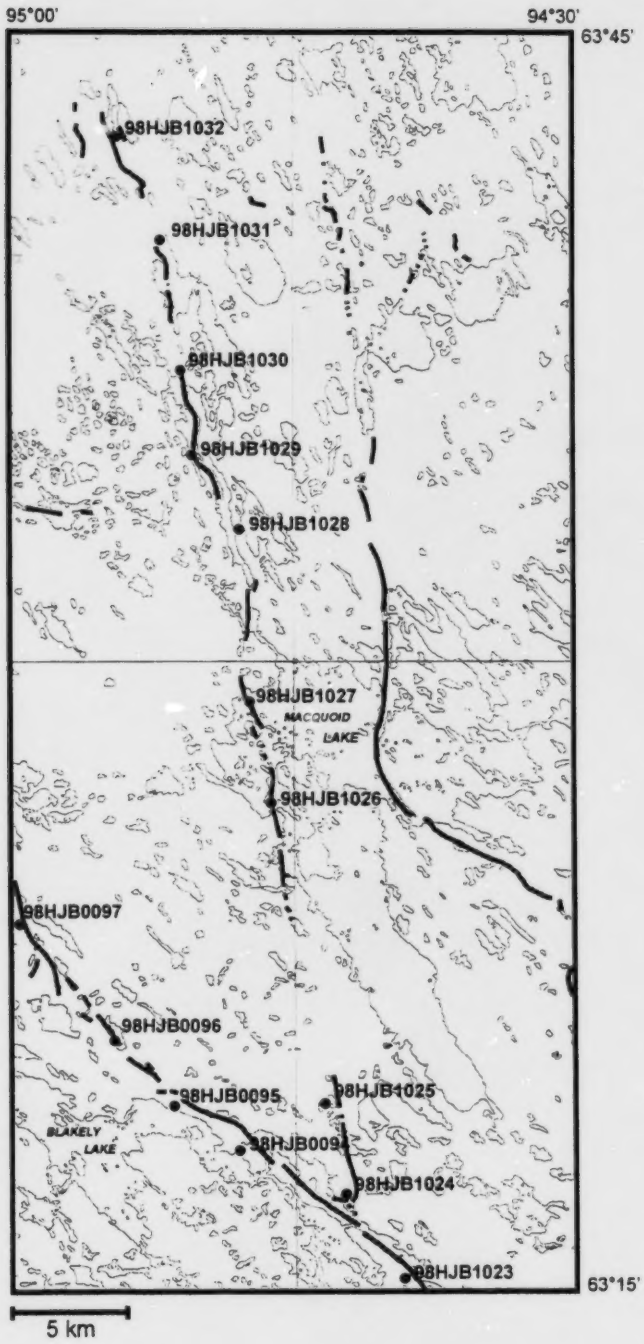


Sample Locations

Regional Samples
- ● Till
- ▲ Diamicton
- ■ Glaciomarine sand and gravel

Profiles
- ★ Pit sites

Figure 10: Esker Sample Locations
MacQuoid Lake Area (55M/7 and M/10)



Till was the preferred sample medium for the regional study, although glaciomarine sand was sampled at several sites (Appendix 2). Pits were dug to 40-70 cm depth and samples were collected at the base where the material appeared to be well homogenized, in most cases. Sediment containing either organic material or iron and manganese staining indicative of postglacial weathering was avoided, where possible. At all sites, 10 kg of sediment was put into a thick, clean, plastic bag and observations were recorded on the site and sediment type as well as sample depth, colour, texture, and structure, etc.(Appendix 2). At one site, two tills (98HJB0025 and 98HJB0026) differing in texture and colour were observed; both were collected. The tills may represent deposits from two ice flow events. At all other sites, only one till was observed and it is assumed that it was deposited by the last phase of south and southeastwardly ice flow.

Soil profiles were sampled at three sites representing three different depositional settings: glaciomarine sand, till in Rögen moraine, and striped till (Appendix 2)(Fig. 9). Pits were dug in mudboils to permafrost and 3 kg samples were collected at 10 cm intervals from the carapace downward. Observations were recorded on sample depth, colour, structure, texture, etc. Earlier studies in the Kaminak Lake area by Shilts (1977) examined the trace element geochemistry of the <0.002 mm fraction and heavy mineral suite of till collected from profiles in mudboils. He concluded that extensive chemical and physical leaching takes place in the active layer of permafrost terrain. In the active layer, trace element concentrations were low in the heavy mineral suite and high in the clay-sized fraction compared to the underlying frozen layer where the reverse was true. The importance of near-surface processes on till geochemisty was tested by Klassen (1995) in the Baker Lake region. He found no significant geochemical differences among the clay-sized fractions of sediment in mudboils.

Eskers in the study area were also sampled in order to compare the lithologic composition of the pebble fraction with the surrounding till and to assess transport distances. Pebbles were collected from reworked (beach) deposits on the esker surface with minimal secondary FeMn staining and lichen growth. This material undoubtedly reflects the composition of the coarser fraction of esker sediment at that site.

Analytical Procedures

Sample preparation and analytical methods for regional sediment samples are summarized in Figure 11. One sub-sample (approximately 3 kg) was air-dried and dry-sieved using a stainless steel 230 mesh screen to obtain the <0.063mm fraction for geochemical and organic carbon. The remainder of the sample was wet-sieved to isolate the 4-8 mm fraction for pebble composition analysis. From another sub-sample (approximately 3 kg), the <0.002 mm fraction was obtained using the centrifugation and decantation method (Lindsay and Shilts, 1995). Approximately 0.5 kg of the original sample was used for complete grain size analyses; a fourth sub-sample was archived.

Descriptions of various analytical techniques and their limitations are presented in Fletcher et al (1986), Franklin et al (1991), and Rose et al (1979), among others. For this study, approximately 1g samples of the <0.002 mm (clay-sized) and <0.063mm (silt plus clay sized) fraction were analyzed using ICP-AES (inductively coupled plasma atomic emission spectrometry) after nitric-aqua regia digestion. Hg was determined using cold-vapour AAS (atomic absorption spectrometry) on the <0.002 mm fraction. Au, Pt and Pd concentrations were determined by fire assay/AFS (atomic fluorescence spectrometry) analysis on approximately 30 g of the <0.063 mm fraction. In addition, the organic carbon content was determined for both size fractions using the loss-on-ignition method (Sheldrick, 1984). The results are summarized in Appendix 4 and 5.

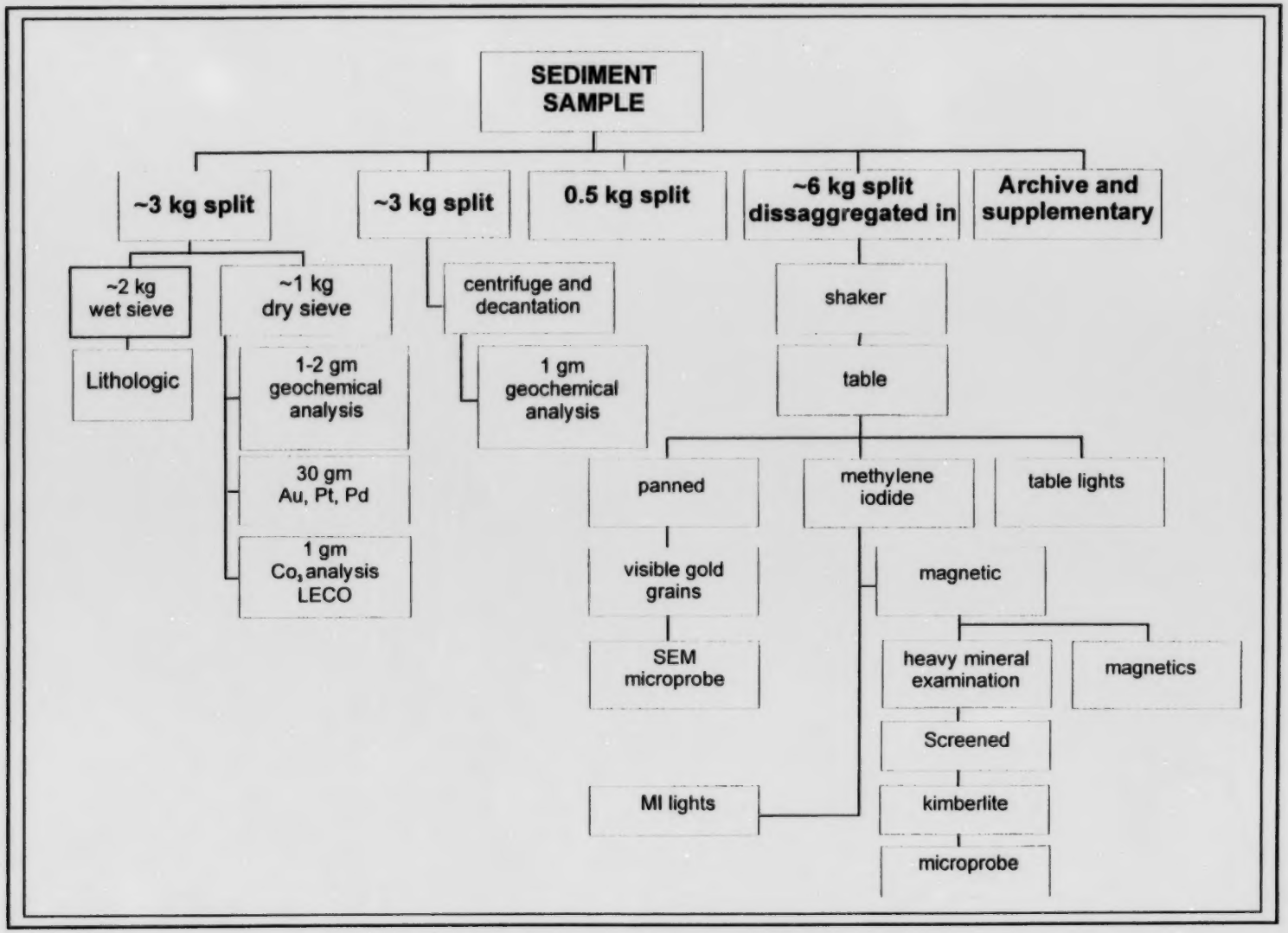


Figure 11: Flow diagram for sample preparation and analyses.

Complete grain size analyses involves a two-step process (Klassen et al, 2000). Initially, approximately 300 g of dried sample is passed through a sieve stack to determine the percentage of each component finer than 2 mm. In a separate step, a Particle Size Analyzer (PSA) (Lecotrac LT-100) is used to determine the proportions of silt and clay-sized material. Results of grain size analyses are summarized in Appendix 7.

The number percent of the various lithologies comprising the pebble fraction (4-8 mm) of till and esker samples was determined by visual counts of 300 pebbles (maximum). Pebble lithologies were broadly divided into three groups, which were subdivided into more specific rock types. These subdivisions were selected in order to map glacial dispersal of exotic debris derived from the Dubawnt Supergroup which outcrops west of the study area and that of more local debris associated with the Archean terrane. The divisions consist of rocks derived from Dubawnt Supergroup lithologies (subgroups include arkosic sandstone, volcanic rocks, quartz sandstone), those specific to the Archean greenstone belt (subgroups include felsic and mafic metavolcanic rocks, metasedimentary rocks) and those derived from plutonic sources (subgroups include granitoid, mafic and ultramafic rocks). Results of lithological analyses of both till and esker samples are summarized in Appendix 8.

The remainder of the original sample (approximately 7 kg) was processed by Overburden Drilling Management Ltd. to extract a <2 mm (10 mesh) heavy mineral concentrate. Separation was achieved using a shaker table and diluted methylene iodide (s.g. 3.1). Visible gold grains observed on the shaker table and through panning were counted and classified on the basis of size and morphology (Appendix 9). The grains were classified into three categories based on morphology: pristine, modified, and reworked (Averill and Zimmerman, 1986; DiLabio, 1990). These shape classes reflect the basic appearance and surface texture of the grain and may be used as an indication of glacial transport distance.

The >0.025 mm fraction of the non-ferromagnetic heavy mineral concentrate was also removed for examination for kimberlite indicator minerals. Results of these analyses are incomplete and will be presented in a separate open file.

Samples collected in soil profiles were subjected to the same analytical scheme (Fig. 11) (Appendix 6) with the exception of the following analyses: Au, Pt, and Pd (<0.063 fraction), lithological, and gold grain and kimberlite indicator mineral. In addition, the <0.002 mm fraction of samples from Pit 1 was not separated or analyzed because of the sandy texture of the material.

Quality Control

The quality of geochemical data is described in terms of precision and accuracy. Precision is a measure of the consistency of repeated analyses of the same sample and was monitored using duplicates of submitted field samples. Duplicate samples were chosen based on the amount of material available after laboratory preparation and were given different sample numbers from originals. Analytical accuracy is a measure of proximity of analytical results to "the right" values and was monitored with an internal laboratory standard. This standard is uncertified, but has been used for many years at the Geological Survey to monitor analytical variability between submissions and ensure year to year consistency in results. Control samples, both standards and duplicates, constitute approximately 5% of the batch.

Analytical results of duplicate samples and standard reference material for the <0.002 and <0.063 mm sized fractions are given in Appendix 10. Values are consistently low for all regional samples. Despite this, duplicate analyses show fairly good reproducibility for those elements

occurring above their detection limits. Results for elements occurring near their detection limits, or those insensitive to the analytical method (eg. Ag, As, Be, Bi, Cd, Ga, Hg, Mo, Sb, Sc, Tl, U, and W), are not reproducible.

The statistical determination of analytical error was calculated with the precision expressed as the percentage relative standard deviation (Garrett, 1973) (Appendix 10). For the clay-sized fraction (<0.002 mm), the precision of the major elements averages ± 10%, ranging from ± 14% (Al) to ± 6% (Fe). For trace elements, the precision is ± 11% or less, with the exception P (±19%) and As (±17%). For the silt-plus-clay-sized fraction (<0.063 mm), the precision for most elements is generally well below ± 10%, and as low as ±3% (Zn). Notable exceptions include Al, K, Ti, Sr, Pb, and Co (precision range ±15 to 24%), As (±70%) and Au (±123%). The large apparent errors in analytical precision, in general, are a result of the low concentrations in the sediments and the fact that small differences in values can represent a significant proportion of total concentrations. For other elements, it is a function of the insensitivity of the analytical method for that element (eg. As). Analyses of duplicates of the <0.063 mm fraction for Au show poor reproducibility.

Analytical results for the laboratory standard are also shown in Appendix 10. Values for the standard are based on the mean of 12 analyses from 1998-99. For most elements, the precision is less than ±5%, which indicates a fairly high degree of accuracy. Again, those elements showing less precise results have values close to the detection limit (eg. As, Pb) or are major elements with low concentrations (eg. Ca, K, Ti). The exception is Ba and La.

Results

The results of analyses of the regional samples (Appendix 1 through 9) are included on diskette in excel format. Based on the results of geochemical analyses of regional samples, univariate statistics and regional distribution maps are presented for those elements with a range of values above detection limit (Appendix 11). Geochemical profiles for samples collected from the three pits are shown in Appendix 12, and the results of the lithological analysis of regional till and esker samples are summarized on regional distribution maps in Appendix 13 and 14, respectively.

Till Geochemistry

Regional Samples

Glacial dispersal trains occur at a variety of scales ranging from continental (hundreds to thousands of kilometers) to local (kilometers to tens of kilometers) (Shilts, 1984). They comprise a "head" or area of high metal concentration at or near the source and a "tail" of dispersal where metal levels are slightly above background. The tail is larger than the head and is commonly the part of the dispersal train intercepted by widely spaced sampling, such as undertaken in this study. The major objective of drift prospecting is to detect glacial dispersal trains from mineralized bedrock and trace it back to the source. In order to recognize the subtle geochemical signature of the tail of a dispersal train, sample and analytical control must be precise enough to differentiate it from background concentrations (Shilts, 1984).

To compare and assess the importance of each sample, a systematic approach to collection, analysis and interpretation is required beginning in the field with a classification and description of the soil (Appendix 2). All samples in this study were collected from mudboils and till was the preferred sample medium because the composition directly reflects that of the bedrock along the path of ice flow, modified by glacial processes associated with erosion, transport and deposition. Other sediment types were also collected. Nearshore marine sediment, reworked from till deposits, also forms mudboils and was collected at several sites. The extent of the reworking

varies resulting in a continuum of textures ranging from samples with minor sorting (classified as diamicton) to well sorted beach deposits (classified as glaciomarine) (Appendix 2). Despite careful collecting procedures, the quality of the samples may also vary depending on the amount of sediment mixing during mudboil formation and the degree to which organic material or secondary Fe/Mn oxides have been incorporated into the soil. Both organic and Fe/Mn compounds tend to adsorb and complex with trace elements, resulting in inflated concentrations. The results of the geochemical analyses of all sediment samples collected are included in the regional database, although the geochemical signature of bedrock is more difficult to interpret in samples classified as diamicton or glaciomarine sediment (Shilts, 1976).

Geochemical maps of the study area for the <0.002 mm (clay-sized) and <0.063 mm (silt-plus-clay-sized) fractions are presented in Appendix 11. For each element, a summary table of univariate statistics, including the mean, standard error, median, mode, standard deviation, range, etc. are given, as well as the analytical method. For statistical calculations and geochemical maps, analyses reported as less than the detection limit are included at concentrations one-half the detection limit. Regional geochemical maps have been prepared for all elements with a range of concentrations above detection limit. Dot symbols are proportional to element concentrations, and are centered on sample locations. Because these maps are intended to highlight areas of potential mineralization, class intervals emphasize those samples with the higher concentrations, and the smallest interval represents concentrations below the 50th percentile.

For each size fraction analyzed, correlation coefficients are given as an indication of the relative strength of linear relationships between elements (Table 2). As a rough guide, correlation coefficients >0.5 indicate that the elemental concentrations could be directly related. Negative correlations indicate an inverse relationship. For the <0.002 mm fraction, trace elements, with the exceptions of As, Ba, Pb, P, Hg and Sr, tend to be positively correlated with each other and the major elements Al, Fe, Mg and Ti. Potassium correlates positively with other major elements, and with Ni and Zn. Only Hg and P show a linear relationship with organic content, although P concentrations are affected by sodium metaphosphate used in the separation technique and, consequently, useless. For the <0.063 mm fraction, more elements are interrelated and correlations are stronger than for the finer sized fraction, probably because of the lower concentrations associated with the silt and clay fraction. Only As and Sr show no linear relationship with any other element. It has been postulated that inter-element correlations reflect common mineralogical controls on trace element concentrations (Klassen and Knight, 1996).

Direct comparison between the geochemistry of the clay-sized and the silt and clay-sized fraction is shown graphically in Figure 12. For the majority of elements, the range of values and geochemical contrast is greater in the clay-sized fraction (<0.002 mm). Metal levels in the <0.063 mm fraction are strongly related to the amount of clay-sized material in the sample, since the coarser fraction (>0.002 mm) is composed primarily of geochemically inert minerals (e.g. quartz)(Shilts, 1984). Correlation coefficients for trend lines shown on Figure 12 indicate a linear relationship for K, Mg, Ti, Co, Sr, and Zn. The correlation matrix comparing elemental relationships between the two sized fractions (Table 3) indicates linear relationships between elemental concentrations for most elements, with the exception of As, Ca, Co, Mn, P, and Pb. The main inter-element relationship is between Al, K, Mg with each other and Cr, Cu, Fe, Mn, Ni, V, and Zn. These major elements (Al, K and Mg) are characteristic of phyllosilicates, mainly micas and chlorite, and the relationship suggests that trace metal concentrations may be linked primarily to these minerals, as indicated by Klassen and Knight (1996) and Klassen (2000).

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Table 2: Correlation matrix for geochemistry of regional sediment samples. Correlation coefficents > 0.5 are shaded.

a) <0.002mm fraction

	Al (%)	As (ppm)	Ba (ppm)	Ca (%)	Co (ppm)	Cr (ppm)	Cu (ppm)	Fe (%)	Hg (ppb)	K (%)	Mg (%)	Mn (ppm)	Ni (ppm)	P (ppm)	Pb (ppm)	Sr (ppm)	Ti (%)	V (ppm)	Zn (ppm)	LOI (%)
Al (%)	1.00																			
As (ppm)	0.30	1.00																		
Ba (ppm)	0.27	0.07	1.00																	
Ca (%)	0.18	-0.18	-0.07	1.00																
Co (ppm)	0.57	0.32	-0.03	0.54	1.00															
Cr (ppm)	0.69	0.21	-0.01	0.30	0.66	1.00														
Cu (ppm)	0.58	0.50	0.00	0.31	0.77	0.68	1.00													
Fe (%)	0.74	0.34	0.08	0.44	0.80	0.93	0.82	1.00												
Hg (ppb)	-1.40	0.02	-0.16	0.03	0.09	0.15	0.14	-0.10	1.00											
K (%)	0.80	0.15	0.40	0.30	0.39	0.46	0.43	0.54	-0.23	1.00										
Mg (%)	0.84	0.18	0.26	0.49	0.66	0.82	0.81	0.73	-0.19	0.86	1.00									
Mn (ppm)	0.42	0.28	0.01	0.53	0.84	0.44	0.57	0.68	0.09	0.39	0.52	1.00								
Ni (ppm)	0.68	0.30	-0.04	0.47	0.90	0.86	0.83	0.73	0.07	0.53	0.76	0.67	1.00							
P (ppm)	-0.39	0.05	-0.23	0.02	-0.02	0.03	-0.11	-0.03	0.37	-0.50	-0.46	0.07	-0.08	1.00						
Pb (ppm)	0.42	0.32	0.04	-0.13	0.20	0.33	0.20	0.49	-0.05	0.10	0.19	0.14	0.25	0.10	1.00					
Sr (ppm)	-0.17	-0.31	-0.15	-0.12	-0.48	-0.08	-0.39	-0.37	-0.09	-0.29	-0.34	-0.57	-0.28	-0.02	0.14	1.00				
Ti (%)	0.39	0.03	-0.10	0.80	0.74	0.59	0.58	0.64	0.10	0.46	0.63	0.67	0.71	-0.08	-0.13	-0.34	1.00			
V (ppm)	0.67	0.20	0.02	0.45	0.80	0.76	0.64	0.86	0.03	0.48	0.70	0.58	0.77	-0.11	0.23	-0.32	0.77	1.00		
Zn (ppm)	0.76	0.35	0.27	0.40	0.67	0.48	0.62	0.80	-0.16	0.82	0.89	0.64	0.66	-0.31	0.30	-0.55	0.58	0.63	1.00	
LOI (%)	0.00	0.24	-0.11	-0.16	0.33	0.35	0.28	0.14	0.52	-0.32	-0.24	0.26	0.20	0.51	0.13	-0.20	0.08	0.24	-0.15	1.00

b) <0.063 mm fraction

	Al (%)	As (ppm)	Ba (ppm)	Ca (%)	Co (ppm)	Cr (ppm)	Cu (ppm)	Fe (%)	K (%)	Mg (%)	Mn (ppm)	Ni (ppm)	P (ppm)	Pb (ppm)	Sr (ppm)	Ti (%)	V (ppm)	Zn (ppm)	LOI (%)
Al (%)	1.00																		
Ba (ppm)	0.29	1.00																	
Ba (ppm)	0.81	0.34	1.00																
Ca (%)	0.51	-0.01	0.19	1.00															
Co (ppm)	0.70	0.11	0.45	0.71	1.00														
Cr (ppm)	0.62	0.22	0.57	0.54	0.75	1.00													
Cu (ppm)	0.80	0.24	0.62	0.52	0.78	0.78	1.00												
Fe (%)	0.91	0.26	0.70	0.62	0.82	0.88	0.78	1.00											
K (%)	0.96	0.29	0.80	0.53	0.69	0.80	0.77	0.90	1.00										
Mg (%)	0.89	0.19	0.68	0.66	0.90	0.87	0.82	0.94	0.88	1.00									
Mn (ppm)	0.68	0.16	0.56	0.63	0.67	0.63	0.61	0.83	0.74	0.85	1.00								
Ni (ppm)	0.79	0.19	0.64	0.62	0.90	0.92	0.87	0.96	0.78	0.93	0.76	1.00							
P (ppm)	-0.19	-0.21	-0.30	0.50	0.25	0.17	-0.02	0.03	-0.16	0.08	0.13	0.21	1.00						
Pb (ppm)	0.56	0.32	0.55	0.16	0.29	0.55	0.39	0.55	0.58	0.46	0.35	0.43	-0.14	1.00					
Sr (ppm)	0.15	0.10	0.18	-0.04	-0.27	0.23	-0.14	0.06	0.10	-0.10	-0.27	-0.08	0.06	0.39	1.00				
Ti (%)	0.25	-0.03	-0.15	0.76	0.66	0.35	0.32	0.46	0.29	0.47	0.49	0.42	0.42	-0.02	-0.19	1.00			
V (ppm)	0.80	0.19	0.48	0.71	0.83	0.90	0.73	0.92	0.78	0.91	0.76	0.88	0.23	0.45	0.08	0.63	1.00		
Zn (ppm)	0.88	0.25	0.69	0.67	0.85	0.76	0.84	0.94	0.90	0.94	0.86	0.88	-0.08	0.46	-0.20	0.42	0.82	1.00	
LOI (%)	0.57	0.16	0.43	0.01	0.43	0.59	0.64	0.55	0.45	0.51	0.36	0.51	-0.35	0.37	-0.01	0.05	0.52	0.52	1.00

Table 2: Correlation matrix for geochemistry of regional sediment samples. Correlation coefficents > 0.5 are shaded.

a) <0.002mm fraction

	Al (%)	As (ppm)	Ba (ppm)	Ca (%)	Co (ppm)	Cr (ppm)	Cu (ppm)	Fe (%)	Hg (ppb)	K (%)	Mg (%)	Mn (ppm)	Ni (ppm)	P (ppm)	Pb (ppm)	Sr (ppm)	Ti (%)	V (ppm)	Zn (ppm)	LOI (%)
Al (%)	1.00																			
As (ppm)	0.30	1.00																		
Ba (ppm)	0.27	0.07	1.00																	
Ca (%)	0.18	-0.18	-0.07	1.00																
Co (ppm)	0.57	0.32	-0.03	0.54	1.00															
Cr (ppm)	0.69	0.21	-0.01	0.30	0.68	1.00														
Cu (ppm)	0.58	0.50	0.00	0.31	0.77	0.68	1.00													
Fe (%)	0.74	0.34	0.08	0.44	0.80	0.66	0.62	1.00												
Hg (ppb)	-1.40	0.02	-0.16	0.03	0.09	0.15	0.14	-0.10	1.00											
K (%)	0.80	0.15	0.40	0.30	0.39	0.46	0.43	0.54	-0.23	1.00										
Mg (%)	0.84	0.18	0.26	0.49	0.66	0.62	0.61	0.73	-0.19	0.86	1.00									
Mn (ppm)	0.42	0.28	0.01	0.53	0.84	0.44	0.57	0.68	0.09	0.39	0.52	1.00								
Ni (ppm)	0.68	0.30	-0.04	0.47	0.86	0.86	0.63	0.73	0.07	0.53	0.76	0.67	1.00							
P (ppm)	-0.39	0.05	-0.23	0.02	-0.02	0.03	-0.11	-0.03	0.37	-0.50	-0.46	0.07	-0.08	1.00						
Pb (ppm)	0.42	0.32	0.04	-0.13	0.20	0.33	0.20	0.49	-0.05	0.10	0.19	0.14	0.25	0.10	1.00					
Sr (ppm)	-0.17	-0.31	-0.15	-0.12	-0.48	-0.08	-0.39	-0.37	-0.09	0.29	-0.34	-0.57	-0.28	0.02	0.14	1.00				
Ti (%)	0.39	0.03	-0.10	0.80	0.74	0.59	0.58	0.64	0.10	0.46	0.63	0.67	0.71	-0.08	-0.13	-0.34	1.00			
V (ppm)	0.67	0.20	0.02	0.45	0.80	0.76	0.64	0.86	0.03	0.48	0.70	0.58	0.77	-0.11	0.23	-0.32	0.77	1.00		
Zn (ppm)	0.76	0.35	0.27	0.40	0.67	0.48	0.62	0.80	-0.16	0.82	0.89	0.64	0.66	-0.31	0.30	-0.55	0.58	0.63	1.00	
LOI (%)	0.00	0.24	0.11	-0.16	0.33	0.35	0.28	0.14	0.52	-0.32	-0.24	0.26	0.20	0.51	0.13	-0.20	0.08	0.24	0.15	1.00

b) <0.063 mm fraction

	Al (%)	As (ppm)	Ba (ppm)	Ca (%)	Co (ppm)	Cr (ppm)	Cu (ppm)	Fe (%)	K (%)	Mg (%)	Mn (ppm)	Ni (ppm)	P (ppm)	Pb (ppm)	Sr (ppm)	Ti (%)	V (ppm)	Zn (ppm)	LOI (%)
Al (%)	1.00																		
Ba (ppm)	0.29	1.00																	
Ba (ppm)	0.81	0.34	1.00																
Ca (%)	0.51	-0.01	0.19	1.00															
Co (ppm)	0.70	0.11	0.45	0.71	1.00														
Cr (ppm)	0.82	0.22	0.57	0.54	0.75	1.00													
Cu (ppm)	0.80	0.24	0.52	0.52	0.78	0.78	1.00												
Fe (%)	0.91	0.26	0.70	0.62	0.82	0.86	0.78	1.00											
K (%)	0.96	0.29	0.80	0.53	0.69	0.80	0.77	0.90	1.00										
Mg (%)	0.89	0.19	0.66	0.66	0.90	0.87	0.82	0.94	0.88	1.00									
Mn (ppm)	0.68	0.16	0.56	0.63	0.87	0.63	0.61	0.83	0.74	0.85	1.00								
Ni (ppm)	0.79	0.19	0.54	0.62	0.90	0.92	0.87	0.86	0.78	0.93	0.76	1.00							
P (ppm)	-0.19	-0.21	-0.30	0.50	0.25	0.17	0.02	0.03	0.16	0.08	0.13	0.21	1.00						
Pb (ppm)	0.56	0.32	0.55	0.16	0.29	0.55	0.39	0.55	0.58	0.46	0.35	0.43	0.14	1.00					
Sr (ppm)	0.15	0.10	0.18	-0.04	-0.27	0.23	-0.14	0.06	0.10	0.10	-0.27	0.08	0.06	0.39	1.00				
Ti (%)	0.25	-0.03	-0.15	0.78	0.56	0.35	0.32	0.46	0.29	0.47	0.49	0.42	0.42	-0.02	0.19	1.00			
V (ppm)	0.80	0.19	0.48	0.71	0.83	0.90	0.73	0.92	0.78	0.91	0.76	0.88	0.23	0.45	0.08	0.63	1.00		
Zn (ppm)	0.88	0.25	0.69	0.57	0.85	0.76	0.84	0.94	0.90	0.94	0.86	0.85	0.08	0.46	-0.20	0.42	0.82	1.00	
LOI (%)	0.57	0.16	0.43	0.01	0.43	0.55	0.54	0.55	0.45	0.51	0.36	0.51	-0.35	0.37	-0.01	0.05	0.52	0.52	1.00

Figure 12: Graphical plots showing the relationship between the geochemistry of the <0.002 and <0.063 mm sized fradons for selected elements (74 samples).

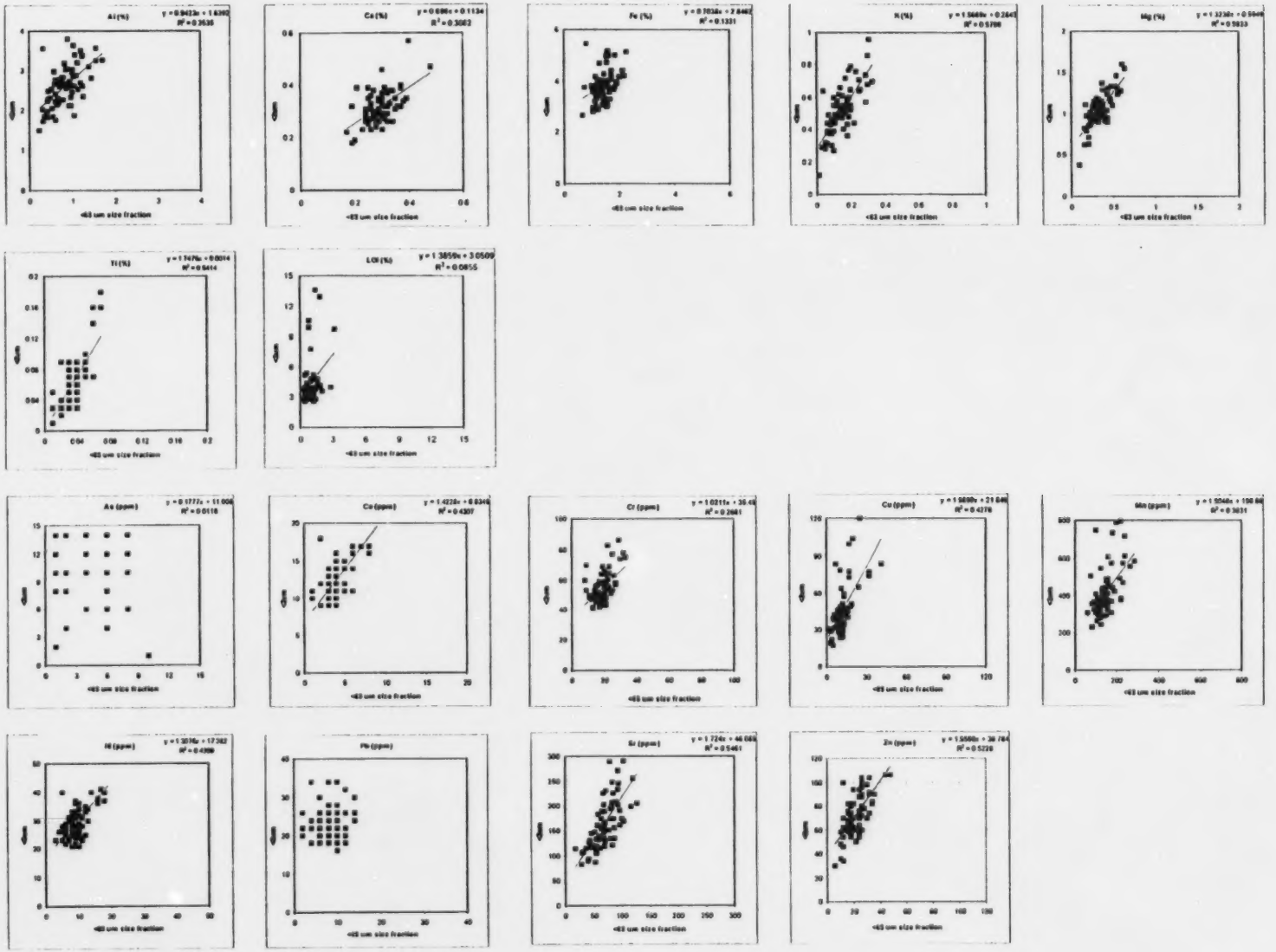


Table 3: Correlation matrix comparing elemental relationships between the clay sized (<0.002mm) and silt plus clay sized (<0.063mm) fractions. Direct elemental comparisons are outlined; positive correlations (>0.5) are shaded.

	Al <63um	As <63um	Ba <63um	Ca <63um	Co <63um	Cr (ppm)	Cu <63um	Fe <63um	K <63um	Mg <63um	Mn <63um	Ni <63um	P <63um	Pb <63um	Sr <63um	Ti <63um	V <63um	Zn <63um	LOI <63um
Al <2um	0.59	0.22	0.32	0.37	0.56	0.55	0.66	0.59	0.55	0.64	0.47	0.60	-0.15	0.22	-0.24	0.31	0.58	0.62	0.43
As <2um	0.09	0.10	-0.04	-0.04	0.23	0.05	0.39	0.06	0.05	0.12	0.10	0.19	-0.07	-0.17	-0.38	-0.03	0.01	0.20	0.17
Ba <2um	0.48	0.23	0.55	0.16	0.27	0.26	0.28	0.38	0.52	0.37	0.36	0.26	-0.31	0.28	0.04	0.00	0.25	0.42	0.14
Ca <2um	-0.04	-0.20	-0.22	0.55	0.36	0.06	0.09	0.13	0.03	0.21	0.28	0.23	0.47	-0.24	-0.30	0.52	0.23	0.14	-0.29
Co <2um	0.18	0.00	-0.13	0.49	0.66	0.31	0.46	0.33	0.14	0.47	0.49	0.54	0.34	-0.16	-0.56	0.56	0.47	0.40	0.21
Cr <2um	0.23	0.02	-0.14	0.34	0.42	0.52	0.45	0.31	0.20	0.42	0.22	0.52	0.21	0.03	-0.20	0.45	0.52	0.29	0.33
Cu <2um	0.24	0.03	-0.13	0.49	0.57	0.39	0.65	0.29	0.20	0.43	0.31	0.56	0.30	-0.04	-0.42	0.45	0.43	0.37	0.19
Fe <2um	0.21	0.08	-0.08	0.35	0.49	0.24	0.38	0.36	0.20	0.42	0.42	0.39	0.08	-0.04	-0.48	0.48	0.42	0.43	0.24
K <2um	0.66	0.18	0.45	0.56	0.65	0.60	0.66	0.71	0.76	0.74	0.67	0.66	-0.05	0.32	-0.22	0.43	0.63	0.77	0.20
Mg <2um	0.58	0.13	0.27	0.66	0.76	0.60	0.66	0.67	0.61	0.77	0.67	0.72	0.13	0.21	-0.29	0.55	0.69	0.71	0.22
Mn <2um	0.07	0.02	-0.12	0.39	0.54	0.11	0.30	0.22	0.10	0.33	0.55	0.36	0.24	-0.23	-0.66	0.46	0.29	0.33	0.05
Ni <2um	0.25	0.02	-0.11	0.53	0.63	0.49	0.57	0.38	0.24	0.53	0.43	0.65	0.35	-0.02	-0.37	0.55	0.55	0.41	0.22
P <2um	-0.58	-0.14	-0.50	-0.42	-0.48	-0.50	-0.45	-0.61	-0.57	-0.55	-0.47	-0.45	-0.03	-0.49	-0.18	-0.25	-0.52	-0.52	-0.20
Pb <2um	0.04	0.27	-0.07	-0.20	-0.10	-0.02	0.14	0.00	0.00	-0.05	-0.08	-0.05	-0.32	0.13	-0.02	-0.11	-0.04	0.04	0.25
Sr <2um	-0.20	-0.05	-0.11	-0.29	-0.48	-0.05	-0.31	-0.25	-0.23	-0.37	-0.52	-0.30	0.09	0.18	0.74	-0.37	-0.23	-0.44	-0.16
Ti <2um	0.06	-0.14	-0.26	0.60	0.55	0.27	0.28	0.30	0.11	0.39	0.43	0.42	0.47	-0.19	-0.46	0.74	0.48	0.32	-0.06
V <2um	0.25	0.02	-0.15	0.47	0.57	0.42	0.40	0.43	0.20	0.50	0.41	0.51	0.22	-0.02	-0.36	0.64	0.61	0.41	0.31
Zn <2um	0.48	0.17	0.21	0.54	0.68	0.38	0.63	0.58	0.55	0.64	0.66	0.57	-0.01	0.12	-0.50	0.53	0.53	0.72	0.20
LOI <2um	-0.27	-0.05	-0.31	-0.22	-0.07	-0.12	-0.08	-0.23	-0.35	-0.19	-0.16	-0.10	-0.02	-0.34	-0.29	0.04	-0.09	-0.22	0.29

Table 3: Correlation matrix comparing elemental relationships between the clay sized (<0.002mm) and silt plus clay sized (<0.063mm) fractions. Direct elemental comparisons are outlined; positive correlations (>0.5) are shaded.

	Al <63um	As <63um	Ba <63um	Ca <63um	Co <63um	Cr (ppm)	Cu <63um	Fe <63um	K <63um	Mg <63um	Mn <63um	Ni <63um	P <63um	Pb <63um	Sr <63um	Ti <63um	V <63um	Zn <63um	LOI <63um
Al <2um	0.59	0.22	0.32	0.37	0.56	0.55	0.66	0.59	0.55	0.64	0.47	0.60	-0.15	0.22	-0.24	0.31	0.58	0.62	0.43
As <2um	0.09	0.10	-0.04	-0.04	0.23	0.05	0.39	0.06	0.05	0.12	0.10	0.19	-0.07	-0.17	-0.38	-0.03	0.01	0.20	0.17
Ba <2um	0.48	0.23	0.55	0.16	0.27	0.26	0.28	0.38	0.52	0.37	0.36	0.26	-0.31	0.28	0.04	0.00	0.25	0.42	0.14
Ca <2um	-0.04	-0.20	-0.22	0.55	0.36	0.06	0.09	0.13	0.03	0.21	0.28	0.23	0.47	0.24	0.30	0.52	0.23	0.14	-0.29
Co <2um	0.18	0.00	-0.13	0.49	0.66	0.31	0.46	0.33	0.14	0.47	0.49	0.54	0.34	-0.16	-0.56	0.56	0.47	0.40	0.21
Cr <2um	0.23	0.02	-0.14	0.34	0.42	0.52	0.45	0.31	0.20	0.42	0.22	0.52	0.21	0.03	-0.20	0.45	0.52	0.29	0.33
Cu <2um	0.24	0.03	-0.13	0.49	0.57	0.39	0.65	0.29	0.20	0.43	0.31	0.56	0.30	-0.04	-0.42	0.45	0.43	0.37	0.19
Fe <2um	0.21	0.08	-0.08	0.35	0.49	0.24	0.38	0.36	0.20	0.42	0.42	0.39	0.08	-0.04	-0.48	0.48	0.42	0.43	0.24
K <2um	0.66	0.18	0.45	0.56	0.65	0.60	0.66	0.71	0.76	0.74	0.67	0.66	-0.05	0.32	-0.22	0.43	0.63	0.77	0.20
Mg <2um	0.58	0.13	0.27	0.66	0.76	0.60	0.66	0.67	0.61	0.77	0.67	0.72	0.13	0.21	-0.29	0.55	0.69	0.71	0.22
Mn <2um	0.07	0.02	-0.12	0.39	0.54	0.11	0.30	0.22	0.10	0.33	0.55	0.36	0.24	-0.23	-0.66	0.46	0.29	0.33	0.05
Ni <2um	0.25	0.02	-0.11	0.53	0.63	0.49	0.57	0.38	0.24	0.53	0.43	0.65	0.35	-0.02	-0.37	0.55	0.55	0.41	0.22
P <2um	-0.58	-0.14	-0.50	-0.42	-0.48	-0.50	-0.45	-0.61	-0.57	-0.55	-0.47	-0.45	-0.03	-0.49	-0.18	-0.25	-0.52	-0.52	-0.20
Pb <2um	0.04	0.27	-0.07	-0.20	-0.10	-0.02	0.14	0.00	0.00	-0.05	0.08	-0.05	-0.32	0.13	-0.02	-0.11	-0.04	0.04	0.25
Sr <2um	-0.20	-0.05	-0.11	-0.29	-0.48	-0.05	-0.31	-0.25	-0.23	-0.37	-0.52	-0.30	0.09	0.18	0.74	-0.37	-0.23	-0.44	-0.16
Ti <2um	0.06	-0.14	-0.26	0.60	0.55	0.27	0.28	0.30	0.11	0.39	0.43	0.42	0.47	0.19	-0.46	0.74	0.48	0.32	-0.06
V <2um	0.25	0.02	-0.15	0.47	0.57	0.42	0.40	0.43	0.20	0.50	0.41	0.51	0.22	-0.02	-0.36	0.64	0.61	0.41	0.31
Zn <2um	0.48	0.17	0.21	0.54	0.68	0.38	0.63	0.58	0.55	0.64	0.66	0.57	-0.01	0.12	-0.50	0.53	0.53	0.72	0.20
LOI <2um	-0.27	-0.05	0.31	-0.22	-0.07	-0.12	-0.08	-0.23	-0.35	-0.19	-0.16	-0.10	-0.02	-0.34	-0.29	0.04	-0.09	-0.22	0.29

Soil Profiles

The vertical geochemical profiles for sediments exposed in three pits (Appendix 2 and 6) are shown in Appendix 12 along with relevant correlation matrices. Pit 1 was dug in sandy glaciomarine sediment and only the silt and clay-sized fraction (<0.063 mm) was analyzed geochemically. The texture of the sediment (Appendix 7) becomes finer with depth from the sandy carapace at the top to fine, well sorted sand at the base; Fe/Mn grain coatings and lenses of organic material are prevalent from 50 to 70 cm depth. Injection features are evident at the base. For some elements, particularly Fe, Cr, Zn and, to a lesser extent, Al and Co, concentrations increase down-hole as the grain size decreases. Aluminium and Cu are positively correlated with organic content (% LOI); Ca and Mg are negatively correlated.

Pit 2 is located in Rögen moraine. Till in the pit appears contorted due to the interfingering of red and red-brown diamicton. This interfingering has been interpreted by Shilts (1978) as a result of cryoturbation bringing relatively unaltered red till into contact with material that has been reworked by surface or near-surface waters. The upper sample, collected in the carapace, is sandy and the underlying sediment becomes finer-grained with depth (Appendix 7 and 12). The organic content (<0.063 mm fraction) and the relative proportion of clay-sized material in the <0.063 mm fraction increases with depth. With the exception of the carapace sample, the concentrations of most elements in the silt and clay-sized fraction increase with depth and there is a strong correlation between trace element concentrations, organic content and texture. For the clay-sized fraction, there is little variation in concentration with depth below the carapace. Because of the fine grain size, the % LOI is not a good measure of organic content for the clay-sized fraction because mineral phases, other than organics, are destroyed during the heating.

Pit 3 was dug in a thick blanket of striped till. As with the previous pit, samples consisted of mixed red and red-brown diamicton and both the proportion of finer sediment and the relative proportion of clay in the silt and clay sized fraction increases with depth. In the <0.063 mm fraction, the distribution pattern of most elements, with the exception of Ti, Ca, and, to a lesser extent, Pb show a strong correlation with the organic content of the sample and with texture. For the <0.002 mm fraction, there is little variation in the elemental concentrations with depth below the carapace, as was seen in the previous pit.

Visible Gold

The results of visible gold grain analysis are presented in Appendix 8. The number and shape of the grains are summarized, based on visual inspection following panning of table concentrates (Fig. 11), and plotted on the bedrock geology map of the area (Tella et al, 1997b). Tabling statistics are also included in the appendix.

No significant gold accumulations are present in the area. A small cluster of relatively high values occurs in the southwestern corner of the map area in the vicinity of the gossan sampled by Tella et al (1997b)(Fig. 4; Table 1); another cluster is present in the northwestern corner. Gold values are low to absent in samples overlying the metavolcanic rocks in the northeast quadrant of the map, where the most mineralized occurrences have been reported (Table 1).

There is no relationship between Au concentrations in the <0.063 mm fraction of sediment samples and visible gold grain counts (Figure 13). The inconsistency of results is common in gold analyses had has been attributed to the particulate nature in which gold occurs (the "nugget"effect) coupled with sample inhomogeneity (Lakin et al., 1974; Nichol et al., 1992).

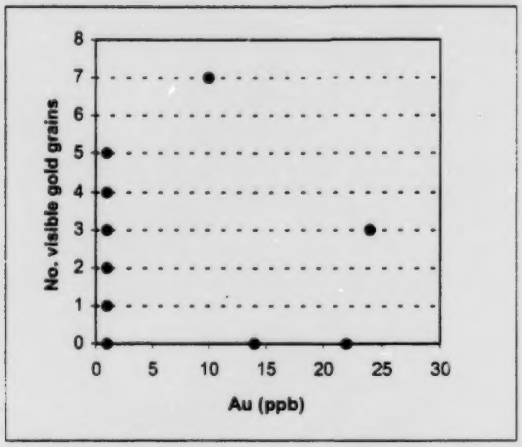


Figure 13: Relationship between Au concentrations in the <0.063 mm and visible Au grain counts.

Pebble Composition

Regional Samples

Maps showing the distribution of various lithologies based on the results of the lithological analyses of the pebble fraction (4-8 mm) of sediment samples (Appendix 8) are presented in Appendix 13. The relative distribution of the various lithological groups (i.e. Dubawnt vs. greenstone vs. plutonic) gives a general indication of the degree of transport of exotic debris derived from rocks of the Dubawnt Supergroup compared to more local Archean lithologies, especially those associated with the greenstone belt.

Dubawnt-derived material comprises approximately 20 to 50% of the pebble fraction of till in the area and is the dominant lithology in those areas mapped as "glacial deposits" (Tella et al, 1997b). In general, the highest proportions are on the western and southern parts of the map area with concentrations decreasing toward the east and southeast. Percentages are also relatively low in the northwestern part of the area. The distribution of specific Dubawnt lithologies indicates that arkosic sandstone (derived from the Kazan Formation) predominates in the northern half to three-quarters of the study area while volcanic lithologies (predominantly Christopher Island, Pitz, and Kunwak Formations) dominate in the southern quarter. This distribution is related to the outcrop areas of these rocks and the dominant southeasterly ice flow.

Greenstone belt rocks comprise approximately 9 to 34% of the pebble fraction of till and the highest concentrations are found in samples overlying or down-ice from their outcrop sources. Two general classes have been distinquished: metavolcanic and metsedimentary rocks, although the latter may be difficult to distinquish from some plutonic rock types, because of the degree of metamorphism. Metavolcanic rocks are primarily associated with outcrop areas in the northeast in association with metasedimentary rocks. The map suggests southeasterly glacial transport of greenstone lithologies 1.5 to 2 km from the margin of the outcrop area before background concentrations are reached.

Plutonic lithologies comprise 33 to 62% of the pebble fraction of the samples. Concentrations are highest in the northwest in samples overlying granitoid rocks, and over or down-ice from outcrop areas in other areas, particularly in the south.

Esker Samples

The relative proportion of the dominant lithological classes in the pebble fraction (4-8mm) of esker samples is shown in Appendix 14. The SE-NW trending esker, which crosses the southern part of the map area, is part of the trunk of a major esker extending from the area of the Keewatin Ice Divide to the coast of Hudson Bay. In this segment of the esker, the relative proportion of pebbles derived from the Dubawnt Supergroup decreases toward the southeast (down-flow) with plutonic lithologies increasing at sites overlying or down-ice from the granitoid outcrop area.

The N-S trending eskers in the region are tributaries to the main esker systems. The pebble composition of sediment collected along the length of this segment indicates a general increase in the relative percentage of Dubawnt-derived debris toward the south. Visual comparison of pebble lithologies in tills and esker samples suggests that the composition of esker sediment is strongly related to that of the adjacent till.

Discussion

In this section, some of the main factors influencing till geochemistry in the study area are discussed. In addition, some particular aspects of the geochemical data are described with emphasis given to those elements of interest to mineral exploration. The discussion is intended to serve as a guide to interpreting the data in this report and for drift prospecting in the Kivalliq Region, in general.

Till Geochemistry and the Dubawnt Dispersal Train

As with this project, previous drift prospecting studies in the Kivalliq region have shown that till is impoverished in most major and trace elements compared with till derived from other areas in the Canadian Shield (Klassen and Knight, 1996; Shilts, 1971b; 1973). The depletion has been attributed to the presence of metal-poor debris derived from sedimentary rocks of the Dubawnt Supergroup, particularly the Thelon Formation sandstone. Glacial erosion and abrasion of this loosely-cemented rock results in glacial debris composed almost entirely of minerals characterized by low concentrations of trace metals (eg. quartz, feldspar, kaolinite). A glacial dispersal train extending tens of kilometers southeast from the outcrop area of the Thelon Formation has been mapped geochemically by the absence of trace metals (Klassen and Shilts, 1977). The effect of this "negative" dispersal train for Cu in till can be seen in the MacQuoid Lake area (55M/7 and M/10)(Fig. 14(a)) by combining data from this study with that of Klassen and Knight (1996). An inverse relationship is present between Cu concentrations and the relative proportion of total Dubawnt granules in till based on samples located in a corridor parallel to ice flow (Fig. 14(b)).

The effect of the Dubawnt dispersal train on till geochemistry in the MacQuoid Lake area is significant. Because of this dispersal, geochemical patterns south of the Proterozoic Baker Lake Basin do not reflect the contact with the crystalline bedrock of the Archean MacQuoid Domain, as noted by Klassen and Knight (1996), despite the clear lithological and geochemical differences between the two geological terranes. The present study was designed, in part, to assess the effects of Dubawnt dispersal in the Archean terrane and to determine methods to extract the geochemical signature of the MacQuoid-Gibson greenstone belt and associated areas of potential

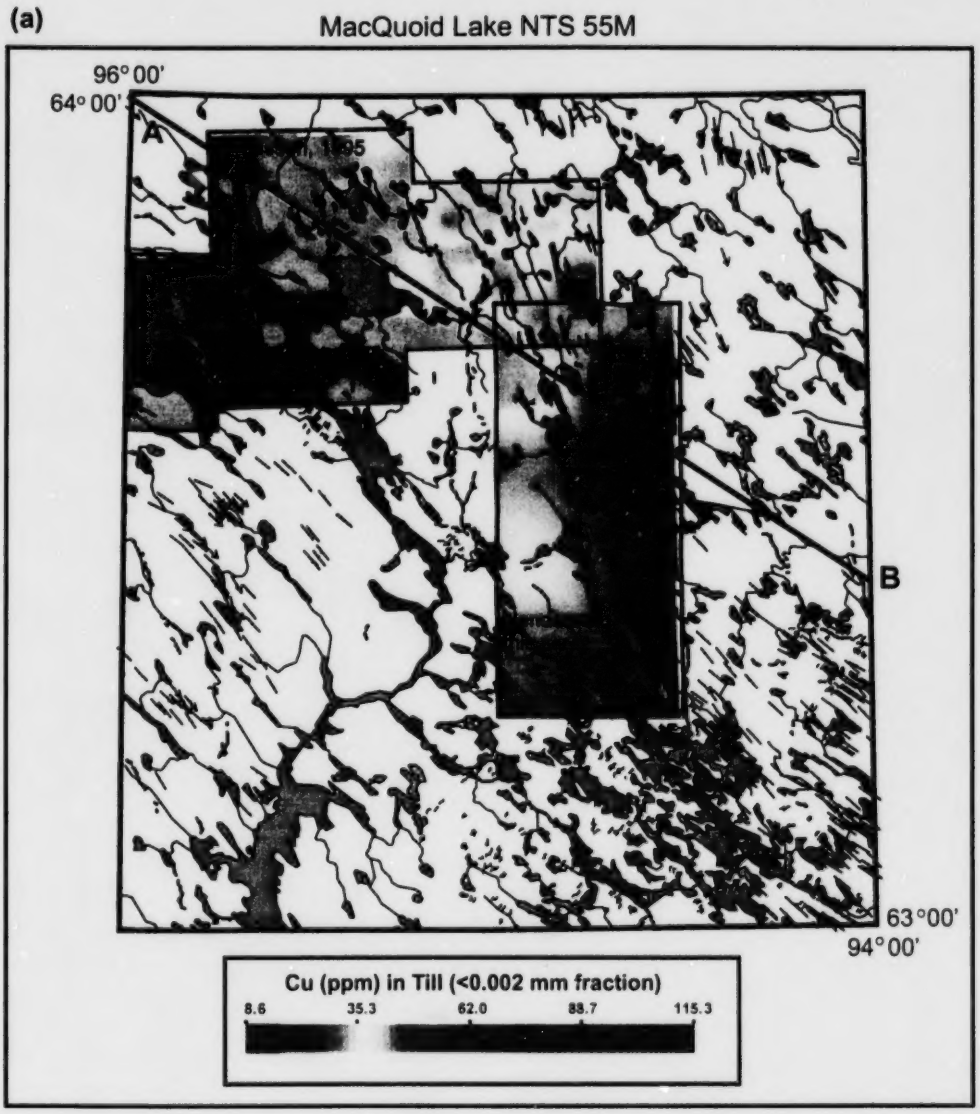
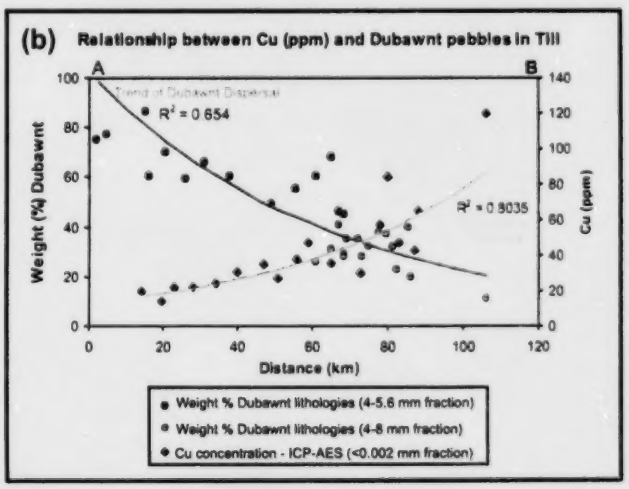


Figure 14: Copper values in till in the MacQuoid Lake area (NTS 55 M).

(a) Contoured map showing Cu concentrations in till based on data from this study and Klassen and Knight (1996). Note the negative geochemical dispersal trend extending southeast from the northwestern edge of the map sheet through the MacQuoid Lake study area. The dispersal trend is parallel to the dominant ice flow direction in the area.

(b) Relationship between Cu concentrations and percentage Dubawnt granules in till along the transect marked A-B, which is parallel to the dominant ice flow direction. Data is from this report and Klassen and Knight (1996).


(b) Relationship between Cu (ppm) and Dubawnt pebbles in Till
A
B
R² = 0.654
R² = 0.8035
Weight (%) Dubawnt
Cu (ppm)
Distance (km)
Weight % Dubawnt lithologies (4-5.6 mm fraction)
Weight % Dubawnt lithologies (4-8 mm fraction)
Cu concentration - ICP-AES (<0.002 mm fraction)

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mineralization. The MacQuoid Lake area (55M/7 and M/10) is particularly well suited for a study of this type, since the greenstone belt trends approximately perpendicular to the dominant ice flow trend. Consequently, dispersal trains associated directly with greenstone belt lithologies may be recognized, even through the geeochemical signature is subtle and more difficult to detect than in other greenstone belts in the Canadian Shield.

A correlation matrix summarizing the relationship between the relative proportion (wt %) of the various lithologies (4-8 mm fraction) representing Dubawnt Supergroup, plutonic and greenstone belt rocks and the elemental concentrations of the clay-sized fraction (<0.002 mm) of tills collected in the study area is shown in Table 4. The strongest negative correlations are present between Dubawnt quartz sandstone (Thelon Formation) and Ca, K, Mg, Ti and Zn. Other correlations are weaker, but there is a negative linear relationship between total Dubawnt and Co, Fe, K, Mg, Mn, Ni, Ti, V, and Zn, based primarily on the relative proportion of Thelon sandstone. The only positive correlation is between Dubawnt lithologies and Sr, particularly Dubawnt volcanics. Assuming that the relative proportion of Dubawnt-derived granules in till is a measure of the proportion in the finer size fraction, these results suggest that the amount of debris derived from Dubawnt Group rocks is a major factor affecting trace and major element concentrations in the area. There is no relationship between till geochemistry and the proportion of granules derived from greenstone belt rocks.

Table 4: Correlation matrix comparing various lithologic classes and till geochemistry (<0.002 mm fraction) for samples collected in the MacQuoid Lake area (55M/7 and M/10). Positive and negative correlation coefficients >0.30 and >–0.30 are shaded, light and dark respectively; coefficients > 0.5 are shown in bold print and >–0.5 in bold italic print (63 samples).

	Dubawnt Supergroup				Plutonic Lithologies			Greenstone Belt Rocks			
	Arkose (%)	Volcanics (%)	Quartz ss (%)	Total Dubawnt (%)	Felsic (%)	Mafic (%)	Total Plutonic (%)	Metavolc. (%)	Metased. (%)	Felsic Volc. (%)	Total Greenstone (%)
Al (%)	0.01	-0.12	-0.28	-0.23	0.09	-0.20	0.08	-0.13	0.26	-0.15	0.19
As (ppm)	0.01	-0.20	0.15	-0.05	0.00	-0.05	0.00	0.12	0.03	-0.21	0.05
Ba (ppm)	0.13	0.01	-0.20	-0.01	-0.02	-0.16	-0.03	-0.16	0.14	-0.19	0.07
Ca (%)	-0.09	0.07	-0.45	-0.27	0.22	-0.14	0.21	-0.06	0.08	0.17	0.07
Co (ppm)	-0.03	-0.20	-0.29	-0.32	0.16	-0.20	0.14	0.08	0.19	-0.14	0.20
Cr (ppm)	-0.31	0.05	-0.04	-0.23	0.17	0.02	0.17	0.00	0.09	-0.04	0.08
Cu (ppm)	-0.10	-0.16	-0.11	-0.25	0.13	-0.08	0.12	-0.01	0.19	-0.10	0.17
Fe (%)	-0.02	-0.27	-0.30	-0.36	0.27	-0.16	0.26	-0.01	0.14	-0.15	0.12
Hg (ppb)	-0.21	0.12	0.25	0.05	-0.01	0.09	0.00	0.23	-0.15	0.16	-0.05
K (%)	0.01	-0.18	-0.56	-0.42	0.30	-0.25	0.27	-0.20	0.28	-0.23	0.19
Mg (%)	-0.02	-0.18	-0.50	-0.41	0.30	-0.16	0.29	-0.07	0.21	-0.18	0.16
Mn (ppm)	0.01	-0.21	-0.34	-0.32	0.05	-0.26	0.03	0.19	0.25	-0.13	0.30
Na (%)	-0.12	-0.02	0.28	0.05	-0.08	0.16	-0.07	0.26	-0.09	-0.09	0.01
Ni (ppm)	-0.25	-0.10	-0.18	-0.36	0.24	-0.03	0.24	0.09	0.13	-0.07	0.16
P (ppm)	-0.15	0.03	0.36	0.10	-0.06	0.32	-0.04	0.33	-0.19	-0.04	-0.08
Pb (ppm)	-0.06	-0.07	0.17	0.01	-0.09	-0.09	-0.10	0.02	0.10	0.05	0.11
Sc (ppm)	0.06	-0.06	-0.28	-0.15	0.10	-0.12	0.09	-0.09	0.10	-0.14	0.06
Sr (ppm)	-0.33	**0.52**	0.41	0.33	-0.17	0.09	-0.16	-0.24	-0.15	0.49	-0.18
Ti (ppm)	-0.08	-0.05	-0.52	-0.38	0.37	-0.20	0.35	-0.05	0.04	0.00	0.02
V (ppm)	-0.18	-0.02	-0.37	-0.35	0.32	-0.10	0.31	-0.06	0.09	-0.14	0.05
Zn (ppm)	0.09	-0.33	-0.50	-0.43	0.29	-0.23	0.27	-0.03	0.23	-0.29	0.19

mineralization. The MacQuoid Lake area (55M/7 and M/10) is particularly well suited for a study of this type, since the greenstone belt trends approximately perpendicular to the dominant ice flow trend. Consequently, dispersal trains associated directly with greenstone belt lithologies may be recognized, even through the geeochemical signature is subtle and more difficult to detect than in other greenstone belts in the Canadian Shield.

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Table 4: Correlation matrix comparing various lithologic classes and till geochemistry (<0.002 mm fraction) for samples collected in the MacQuoid Lake area (55M/7 and M/10) Positive and negative correlation coefficients >0.30 and >–0.30 are shaded, light and dark respectively, coefficients > 0.5 are shown in bold print and >–0.5 in bold italic print (63 samples).

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	Arkose (%)	Volcanics (%)	Quartz ss (%)	Total Dubawnt (%)	Felsic (%)	Mafic (%)	Total Plutonic (%)	Metavolc. (%)	Metased. (%)	Felsic Volc. (%)	Total Greenstone (%)
Al (%)	0.01	-0.12	0.28	-0.23	0.09	-0.20	0.08	-0.13	0.26	-0.15	0.19
As (ppm)	0.01	-0.20	0.15	-0.05	0.00	-0.05	0.00	0.12	0.03	-0.21	0.05
Ba (ppm)	0.13	0.01	-0.20	-0.01	-0.02	-0.16	-0.03	-0.16	0.14	-0.19	0.07
Ca (%)	-0.09	0.07	***-0.45***	-0.27	0.22	-0.14	0.21	-0.06	0.08	0.17	0.07
Co (ppm)	-0.03	-0.20	-0.29	-0.32	0.16	-0.20	0.14	0.08	0.19	-0.14	0.20
Cr (ppm)	**-0.31**	0.05	-0.04	-0.23	0.17	0.02	0.17	0.00	0.09	-0.04	0.08
Cu (ppm)	-0.10	-0.16	-0.11	-0.25	0.13	-0.08	0.12	-0.01	0.19	-0.10	0.17
Fe (%)	-0.02	-0.27	-0.30	-0.36	0.27	-0.16	0.26	-0.01	0.14	-0.15	0.12
Hg (ppb)	-0.21	0.12	0.25	0.05	-0.01	0.09	0.00	0.23	-0.15	0.16	-0.05
K (%)	0.01	-0.18	***-0.56***	-0.42	0.30	-0.25	0.27	-0.20	0.28	-0.23	0.19
Mg (%)	-0.02	-0.18	***-0.50***	-0.41	0.30	-0.16	0.29	-0.07	0.21	-0.18	0.16
Mn (ppm)	0.01	-0.21	-0.34	-0.32	0.05	-0.26	0.03	0.19	0.25	-0.13	0.30
Na (%)	-0.12	-0.02	0.28	0.05	-0.08	0.16	-0.07	0.29	-0.09	-0.09	0.01
Ni (ppm)	-0.25	-0.10	-0.18	-0.36	0.24	-0.03	0.24	0.09	0.13	-0.07	0.16
P (ppm)	-0.15	0.03	0.36	0.10	-0.06	0.32	-0.04	0.33	-0.19	-0.04	-0.08
Pb (ppm)	-0.06	-0.07	0.17	0.01	-0.09	-0.09	-0.10	0.02	0.10	0.05	0.11
Sc (ppm)	0.06	-0.06	0.28	-0.15	0.10	-0.12	0.09	-0.09	0.10	-0.14	0.06
Sr (ppm)	**-0.33**	**0.52**	0.41	0.33	-0.17	0.09	-0.16	-0.24	-0.15	0.49	-0.18
Ti (ppm)	-0.08	-0.05	***-0.52***	-0.38	0.37	-0.20	0.35	-0.05	0.04	0.00	0.02
V (ppm)	-0.18	-0.02	**-0.37**	-0.35	0.32	-0.10	0.31	-0.06	0.09	-0.14	0.05
Zn (ppm)	0.09	**-0.33**	***-0.50***	-0.43	0.29	-0.23	0.27	-0.03	0.23	-0.29	0.19

Till Geochemisty, Partitioning, and Texture

Direct comparison between the clay (<0.002 mm) and silt and clay (<0.063 mm) fraction has been discussed earlier. For most elements, linear correlations are strong (>0.5), with the exception of As, Fe, P, Pb and % LOI (Table 3), although the magnitude and range of values and, consequently, the geochemical contrast is greater in the clay-sized fraction (Fig. 12). Values in the silt and clay-sized fraction are lower due to higher proportions of geochemically inert minerals (quartz and feldspar) in the silt size range. As a result, the relative proportion of silt in the silt and clay-sized fraction will affect the geochemistry. This can be seen in soil profiles taken at Pit 2 and 3 (Appendix 12) where the relative proportion of clay in the silt and clay fraction is directly proportional to concentration for most elements. For the clay-sized fraction, concentrations show less variation throughout the mudboil for samples collected below the carapace.

The effects of texture on till geochemistry in the Kivalliq region appear significant. As discussed above, this is due largely to the input of debris from the Dubawnt Supergroup, particularly the mature sandstone of the Thelon Formation which is composed predominantly of quartz and kaolinite. Quartz tends to be abraded to silt-size by glaciers (Dreimanis and Vagners, 1971) and contains little or no trace and major elements, other than silicon. Because of the relative low concentrations imposed by texture in the silt and clay-sized fraction and the difficulty in interpreting the subtle geochemical signals that may be associated with the tail of dispersal from a mineralized bedrock source, the clay-sized fraction is the optimal one to use for drift prospecting in the region.

Till Geochemistry, Statistics, and Regional Distribution

The concepts of threshold, background and anomaly are fundamental to interpreting geochemical data. Threshold is the geochemical concentration dividing background from anomalous values and has been defined as the outer limit of background variation (Garrett, 1991). There may be several threshold values in a survey area since the threshold is a function of the geochemical background of the relevant bedrock and/or surficial environment, including processes associated with transport and deposition affecting element concentrations. Although a single threshold is acceptable for elements occurring in rocks in an exploitable form (eg. Au), this is not generally the case for base metals where geochemical patterns can be complex reflecting the great variations in rock forming and mineralization processes.

Examination of the statistical plots and cumulative frequency curves for geochemical data from analyses of samples collected in the MacQuoid Lake area (Appendix 11), indicates that there are no obvious outliers (values which depart significantly from the normal distribution) for many elements. Consequently, the concept of threshold is difficult to apply. In cases such as this, Garrett (1991) advises that it is still wise to check some proportion of the highest or lowest values (2-10%; including concentrations >95th percentile). Individual samples should be assessed to determine whether or not concentrations are legitimately elevated or whether there have been collection or analytical irregularities that might affect the geochemisty. One particular sample (98HJB 0054) in the database falls in the latter category. It is characterized by high to anomalously high concentrations of Cr, Fe, Mo, Ni, and V in the <0.002 mm and <0.063 mm fraction and anomalously low concentrations of Ca and Sr in the <0.002 mm fraction. The particular sample has been classified as glaciomarine sand and the % LOI is much higher than

average, so the significance of the results is suspect. Organic content appears to be a strong control on trace element concentrations as indicated by the soil profiles (Appendix 13).

The regional distribution for most analyzed elements is summarized in geochemical maps plotted on the bedrock geology base (Tella et al, 1997b)(Appendix 11). In the northwest, southeast and central parts of the map-sheet, large areas of the bedrock geology are unmapped because of the presence of thick deposits of glacial sediment. Sediment samples collected in these areas generally have high relative proportions of Dubawnt-derived clasts, in the granule fraction (4-8 mm), and low trace element values (Figure 15). For most major and trace elements (Al, Ca, Co, Cu, Fe, K, Mg, Mn, Ni, Sc, Ti, V and Zn) concentrations are highest in the NE quadrant of the map-sheet overlying volcanic rocks. This distribution is best defined in the clay-sized fraction, although it is also reflected in the silt and clay-sized fraction and suggests that till geochemistry is, at least in part, tied to underlying bedrock composition. The NE quadrant is also characterized by thin drift and tills high in greenstone belt lithologies (Fig. 15a and c). In contrast, strontium concentrations (Appendix 11) are highest in the southern half of the map-sheet, particularly the southwest quadrant, where till is rich in Dubawnt Group lithologies (Fig. 15b)(Henderson, 2000).

The <0.063mm fraction has been analyzed geochemically for gold (Appendix 11) and the number of visible gold grains has been determined (Appendix 9). Any sample containing >10 grains or 10 ppb is considered significant (DiLabio, 1982). There is little correlation between the number of grains recovered by panning and gold geochemistry (Fig. 13); however coincident elevated values are present in the southwestern corner of the map area for both types of analyses.

Acknowledgements

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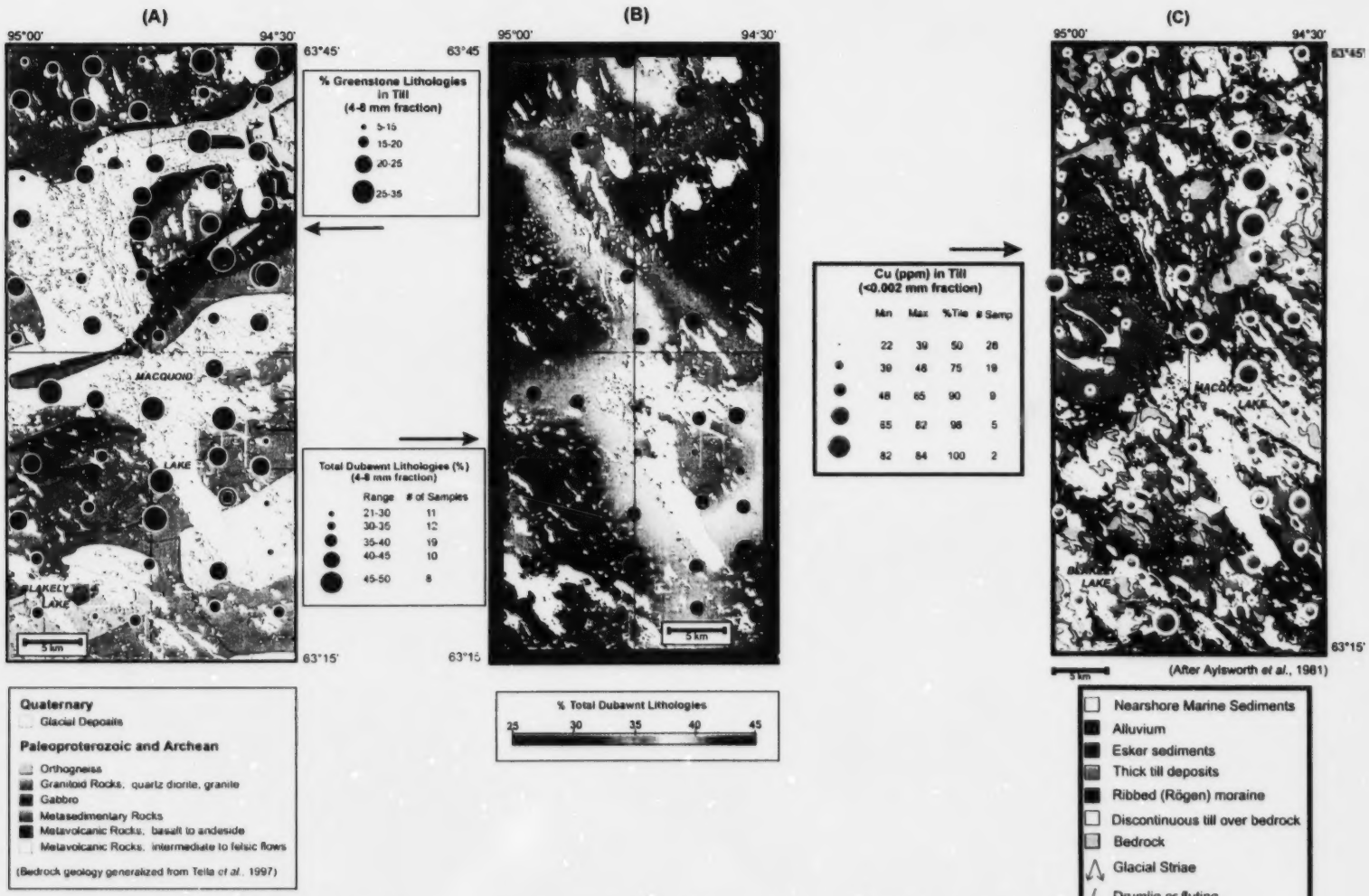

Figure 15: Distribution of Greenstone belt lithologies, Dubawnt Supergroup rocks, and Cu (<0.002mm fraction) in till in relation to bedrock and surficial geology.

The relative percentage of Greenstone Belt lithologies in till is shown superimposed on the bedrock geology map(A). Values are high in areas overlying greenstone belt rocks, and in the northern part of the map area, which lies down-ice from greenstone outcrops. Cu concentrations in till are also high in the northeast quadrant (C).

Large portions of the bedrock map (A) are masked by thick glacial sediment, so that the underlying bedrock lithology is unmapped. These areas tend to be overlain by tills with high proportions of Dubawnt clasts (B). The area in the northeast quadrant with the lowest percentage of Dubawnt clasts is also characterized by thin to discontinuous till cover (C).

It can be hypothesized that the essentially unmetamorphosed rocks of the Dubawnt Supergroup are more susceptible to glacial erosion than rocks of the Archean greenstone terrane and, consequently, produce more transported debris. This suggests that Dubawnt-rich tills will not only dilute the geochemical signature of the local bedrock, but will also physically bury outcrops, so that they are not subject to glacial erosion. Following several glacial events, the input of local debris to overlying tills could be negligible.

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Appendix 1
Ice Flow Indicators
MacQuoid Lake area (55M/7 and M/10)

Sense	1 - direction known (azimuth) 2 - direction unknown
Definition	1 - well defined striae, groove, crescentic features 2 - poorly defined striae, groove, crescentic features 3 - streamlined landform 4 - roche moutonee 5 - crag and tail landform 6 - microstriae
Age	0 - no relative age, unknown 1 - older 2 - younger 3 - youngest 4 - etc.

Appendix 1: Ice Flow Indicators

Stn. No	NTS	UTM			True Orientation	Sense	Definition	Age	Bedrock	Comments
		Zone	Easting	Northing						
98HJB0045	55M	15	402188	7020567	150	1	1	2	Gneiss; metavolcanic, foliated	Dominant, roche moutonée, chatter marks
98HJB0045	55M	15	402188	7020567	142	2	1	1	Gneiss, metavolcanic, foliated	preserved on faceted down-ice surface
98HJB0050	55M	15	407007	7033765	148	1	1	0	gneiss, metavolcanic & granitoid intrusion, foliated	range 148° - 150°; roche moutonée
98HJB0050	55M	15	407007	7033765	182	2	2	0	gneiss, metavolcanic & granitoid intrusion, foliated	many small striae preserved in depression in outcrop surface, significance unknown
98HJB0050	55M	15	407007	7033765	162	2	2	0	gneiss, metavolcanic & granitoid intrusion, foliated	many small striae preserved in depression in outcrop surface, significance unknown
98HJB0050	55M	15	407007	7033765	98	2	2	0	gneiss, metavolcanic & granitoid intrusion, foliated	many small striae preserved in depression in outcrop surface, significance unknown
98HJB0051	55M	15	414104	7021829	145	1	1	0	granitoid, foliated, highly weathered	groove and striae, roche moutonée
98HJB0051	55M	15	414104	7021829	126	2	1	0	granitoid, foliated, highly weathered	grooves near shoreline
98HJB0052	55M	15	419837	7034483	127	1	2	2	mafic metavolcanic; foliated, weathered	preserved on polished surfaces of outcrop, roche moutonée
98HJB0052	55M	15	419837	7034483	267	2	2	1	mafic metavolcanic; foliated, weathered	preserved in depression in outcrop surface
98HJB0053	55M	15	412517	7043543	145	1	1	0	Gneiss; metavolcanic w/ granitoid intrusions, foliated	
98HJB0063	55M	15	413370	7068396	167	1	1	2	foliated gneiss, weathered	roche moutonnée
98HJB0063	55M	15	413370	7068396	137	2	1	1	foliated gneiss, weathered	preserved in down-ice depression
98HJB0064	55M	15	423249	7060022	162	1	1	2	Diorite; highly, weathered, fractured, foliated	range 160° - 170°; roche moutonee
98HJB0064	55M	15	423249	7060022	137	1	1	1	Diorite, highly, weathered, fractured, foliated	preserved on protected surfaces, chatter marks, water erosion channels noted w/ striae at base 140°
98HJB0167	55M	15	418933	7051031	159	1	1	0	Diorite dike in gneiss	roche moutonnée
98HJB0179	55M	15	417303	7017684	149	1	1	1	granitoid; polished	dominant; crescentic fractures
98HJB0179	55M	15	417303	7017684	201	1	1	2	granitoid; polished	fine striae on edge of flat-topped otc; short deep striae on upper otc surface
98HJB0183	55M	15	422669	7040295	137	1	1	0	gneiss, banded; paragneiss w/ amphibolite; foliated	range 137° -143°; crescentic fractures
98HJB0184	55M	15	424957	7032638	139	1	1	0	gneiss, metasediments w/ granitoid intrusions and mafic dikes	dominant; crescentic gouges
98HJB0192	55M	15	406493	7061824	133	2	2	0	mafic volcanic; foliated	poorly developed; preserved in several places on otc; no relationship determined
98HJB0192	55M	15	406493	7061824	153	2	2	0	mafic volcanic; foliated	poorly developed; preserved in several places on otc; no relationship determined

Appendix 2:
Sediment Sample Location and Description
Regional Samples and Soil Profiles

Quaternary unit - map polygon underlying sample site (from Aylsworth et al; 1981)

Sediment Type -

Till- diamicton, poorly sorted sediment, subrounded to angular clasts, fairly compact; deposited directly from glacial ice through lodgement or meltout processes

Diamicton - diamicton, poorly sorted sediment with angular to subrounded clasts, representing till slightly modified by glaciomarine processes; "reworked till"

Sand and/or Gravel (Glaciomarine) -
well sorted fine to medium sand with varying concentrations of pebbles, cobbles or boulders, representing nearshore glaciomarine sediment

Underlying Lithology - bedrock lithology underlying sample site (from Tella et al, 1997b)

Appendix 2
Sediment Sample Location and Description

Station No.	Sample No.	NTS	UTM			Quaternary Unit	Texture	Sediment Type	Depth (cm)	Munsell Colour		Underlying Lithology	Field Observations/Comments
			Zone	Easting	Northing					Colour	Description		
98HJB0115	98HJB0010	55M	15	405002	7068362	Tp	silty	Till	45	7.5YR 5/4	Brown	Ag	Composite sample (2): brown and red-brown diamicton
98HJB0116	98HJB0011	55M	15	408274	7061924	Ts	sandy	Till	40	7.5YR 6/3	Light brown	Av	Very sandy in places
98HJB0142	98HJB0012	55M	15	418053	7069234	Tp (R/T)	sandy	Till	45	7.5YR 5/3	brown	Ag	Pebbly surface, clasts angular, some Dubawnt
98STP0001	98HJB0013	55M	15	423559	7069436	Tp	silty	Till	50	7.5YR 5/3	Brown	Ag	Few small clasts, subangular, some Dubawnt present
98HJB0143	98HJB0014	55M	15	418270	7040694	Tp	sandy	Till	55	7.5YR 5/3	brown	Q	Clasts angular, moderately stoney
98STP0002	98HJB0015	55M	15	422226	7040388	Tp	sandy	Sand	45	7.5YR 6/3	Light brown	Agq	Mudboil poorly developed, covered w/ vegetation, subrounded clasts
98HJB0144	98HJB0016	55M	15	418257	7065661	Tp	gravel?	Sandy gravel	45	5YR 3/3	dark reddish brown	Ag	Clasts angular, stoney
98STP0003	98HJB0017	55M	15	423023	7065533	Tp (R/T)	sandy	Till	50	10YR 5/3	Brown	Afv	Fairly dry till adjacent to outcrop
98HJB0145	98HJB0018	55M	15	418679	7036423	Tp	sandy	Diamicton	30	10YR 5/3	Brown w/ organic	Q	Beach deposit, poor sample
98STP0004	98HJB0019	55M	15	422200	7036604	Tp	sandy	Till	50	5YR 5/3	Reddish brown	As	Fresh mudboil w/pebbles on top, Dubawnt present
98HJB0146	98HJB0020	55M	15	417607	7061945	R/T (Tp)	sandy	Till	55	5YR 4/3	Reddish brown	Afv	Good till, some organic material on one side of sample hole
98STP0005	98HJB0021	55M	15	422371	7060367	Tp	sandy	Till	50	7.5YR 5/3	Brown	Afv	Roots throughout. Near small outcrop
98HJB0147	98HJB0022	55M	15	418217	7033360	R/T	sandy	Till	30-50	7.5YR 5/3	Brown	Agq	Pebbles subangular to subrounded,
98STP0006	98HJB0023	55M	15	422398	7031563	Tp	sandy	Diamicton	45	7.5 YR 4/3	Brown	As	Mudboil located in felsenmeer, not very fresh. Few pebbles.
98HJB0148	98HJB0024	55M	15	418531	7058354	Tp (near esker)	sandy	Till	40-50	5YR 4/3	Reddish brown	Av	Very wet till, few boulders in hole; one rounded most angular
98STP0007	98HJB0025	55M	15	423257	7056482	R/T	sandy	Till	35	7.5YR 5/3	Brown	Q/Av	Sample saturated w/ water, clasts small. Hole collapsing
98HJB0149	98HJB0026	55M	15	418755	7028843	Tp	sandy	Till	45	5YR 5/3	Reddish brown	Agq	
98STP0008	98HJB0027	55M	15	422606	7028339	Tr (Th)	sandy	Till	50	7.5YR 5/3	Brown	Q	Clasts subangular. Near beach.
98HJB0149	98HJB0028	55M	15	418755	7028843	Tp	clayey	Till	45	2.5YR 4/3	Reddish brown	Agq	
98STP0009	98HJB0029	55M	15	422681	7049594	R/T	sandy	Till	50	5YR 5/3	Reddish brown	Agq	Area covered by swamp or felsenmeer. Few pebbles/gravel in till.
98HJB0150	98HJB0030	55M	15	418598	7054366	Tp	sandy	Till	40-50	5YR 5/4	Reddish brown	Ag	Large boulder at base
98STP0010	98HJB0031	55M	15	413491	7043997	Tp	sandy	Till	55	7.5YR 6/4	Light brown	Av	Clasts subrounded; some roots in till. Top of mudboil covered by pebbles to cobbles.
98HJB0151	98HJB0032	55M	15	412809	7069433	Tp	sandy	Till	45-55	7.5YR 6/3	Light brown	Ag	Wet near base of hole, clasts subrounded, boulder on surface
98STP0011	98HJB0033	55M	15	407376	7045260	Tp	silty	Till	50	7.5YR 5/3	Brown	Q	Swampy area. Till contains pebble size clasts or smaller
98HJB0152	98HJB0034	55M	15	407894	7069212	Tp	sandy	Till	45-50	7.5YR 5/4	Brown	Ag	
98STP0012	98HJB0035	55M	15	400803	7044763	Tp	silty	Till	60	2.5YR 5/3	Reddish brown	Pgr	Few clasts near the top of hole; increasing in size and number near base. Sticky till
98HJB0153	98HJB0036	55M	15	401945	7069741	Ts	sandy	Till	45-50	7.5YR 5/3	Brown	Ag	Clasts angular, few cobbles present in hole.
98STP0013	98HJB0037	55M	15	403385	7039189	Tp	silty-sand	Till	45	5YR 6/3	Light reddish brown	Q	Swampy area, few mudboils. Pebbles to cobbles on surface. Brown w/ red brown inclusion.
98HJB0154	98HJB0038	55M	15	402061	7065104	Tp	silty	Till	45-55	10YR 5/3	Brown	Ag	Surface cobbles generally angular-subrounded
98STP0014	98HJB0039	55M	15	407417	7038265	Tp (Th)	sandy	Till	35-40	5YR 5/4	Reddish brown	Q	Flat area near lakeshore; numerous clasts increasing in size with depth
98HJB0155	98HJB0040	55M	15	407593	7064767	Tp	sandy	Till	45-55	7.5YR5/3	Brown	Ag	Red till towards base of hole, Mudboil w/ angular clasts
98STP0015	98HJB0041	55M	15	412809	7037548	Tp	sandy	Till	45-50	5YR 5/4	Reddish brown	Q	Dry sediment. Gravel clasts.
98HJB0156	98HJB0042	55M	15	412548	7064445	Ts	silty-sandy	Till	50-60	7.5YR5/3	Brown	Ag	Irregular pocket of silty bright red brown till
98STP0016	98HJB0043	55M	15	412869	7033494	Th	sandy	Diamicton	40-45	7.5YR 5/3	Brown	Q	Numerous pebbles in till, number increasing w/ depth
98HJB0157	98HJB0044	55M	15	413437	7059994	Tp	sandy	Till	45	7.5YR6/4	Light Brown	Q	Few small clasts on surface, inclusion of red diamicton
98STP0017	98HJB0045	55M	15	407860	7033090	Tp	sandy	Diamicton	50	5YR 6/3	Light reddish brown	Agq	Flat swampy area near lake. Percentage of clasts increasing w/ depth, subrounded
98HJB0158	98HJB0046	55M	15	407267	7058927	Tp	silty	Till	40-50	5YR 4/2	Dark reddish gray	Agq	Clasts angular-subrounded
98STP0018	98HJB0047	55M	15	402168	7032719	Tp	sandy-silty	Till	50	2.5YR 5/3	Reddish brown	Av	Several mudboils surrounded by swamp. Cobbles in till.
98HJB0159	98HJB0048	55M	15	401619	7058736	Tp	silty	Till	40-50	2.5YR 5/4	Reddish brown	Q	Many cobbles rounded to subrounded
98STP0019	98HJB0049	55M	15	400291	7028089	Tp (near esker)	sandy	Till	60	2.5YR 5/4	Reddish brown	Q	Beach nearby. Roots; sand w/ gravel and pebbles near base of pit
98HJB0160	98HJB0050	55M	15	401654	7054861	Tp	silty	Till	40-55	2.5YR 5/3	Reddish brown	Q	Clasts rounded to subrounded, sticky homogeneous
98STP0020	98HJB0051	55M	15	412373	7027945	Tp	silty	Till	50	5YR 5/3	Reddish brown	Agq/As	Brown till w/ red till inclusion; clasts subangular
98HJB0162	98HJB0052	55M	15	412528	7054567	Ts	sandy	Till	45-55	7.5YR 4/3	Brown	Av	Clasts angular to subangular, few rounded, Dubawnt common
98HJB0163	98HJB0054	55M	15	407057	7054690	Tr	sandy	Sand	55-60	7.5YR 4/6	Strong brown	Q	Few pebbles at base of pit.
98HJB0164	98HJB0056	55M	15	400698	7049064	Tp	sandy	Till	45-55	5YR 5/3	Reddish brown	Pgr	Irregular patches of silty sandy red brown diamicton
98STP0021	98HJB0057	55M	15	407136	7028482	Tp	sandy	Till	50	5YR 5/3	Reddish brown	Agq	Few mudboils; pebbles on mudboil surface
98STP0022	98HJB0059	55M	15	402168	7023887	Tp	sandy	Till	45	5YR 5/3	Reddish brown	As	Till very dry and pebbly
98HJB0165	98HJB0060	55M	15	406602	7049647	Tp	sandy	Till	45 55	7.5YR 5/3	Brown	Q	Sticky, wet, wall collapsing; clasts angular to subrounded
98STP0023	98HJB0061	55M	15	407683	7023737	Tp (Tr)	sand	Sand	55	19YR 5/4	Yellowish brown	Q	Very dry till, clasts at base of pit
98HJB0166	98HJB0062	55M	15	412375	7049466	Tp	silty-sand	Till	45	7.5YR 5/3	Brown	Av	Thin layer of red till present; clasts angular to subrounded
98STP0024	98HJB0063	55M	15	412251	7023229	Tp (Am)	sandy	Till	60	5YR 5/3	Reddish brown	Q	Till saturated w/ water; numerous cobbles and pebbles
98HJB0167	98HJB0064	55M	15	418933	7051031	Tp (R/T)	sandy	Sand	40-45	7.5YR 5/4	Brown	Afv	Variable texture and colour; sandy below 45cm
98STP0025	98HJB0065	55M	15	418035	7023054	Tp	sandy	Till	55	7.5YR 5/4	Brown	Q	Near beach; Small pebbles in a relatively moist till.

Appendix 2
Sediment Sample Location and Description

Station No.	Sample No.	NTS	UTM Zone	UTM Easting	UTM Northing	Quaternary Unit	Texture	Sediment Type	Depth (cm)	Munsell Colour		Underlying Lithology	Field Observations/Comments
										Colour	Description		
98HJB0168	98HJB0066	55M	15	423071	7049574	R/T	silty	Till	45-50	7.5YR 5/3	Brown	Agq	Till wet and sticky; few roots around pebbles; clasts angular
98STP0026	98HJB0067	55M	15	422728	7024351	Ts	silty	Till	55	5YR 5/3	Reddish brown	Q	Good till; numerous cobbles and pebbles at base of pit
98HJB0169	98HJB0068	55M	15	422455	7045231	Tp	silty	Till	45-55	7.5YR 5/3	Brown	Q	Taken from fresh mudboil w/ angular pebbles on top; colour variation in pit
98STP0027	98HJB0069	55M	15	423622	7018466	Tp (Tr)	sandy	Till	60	5YR 5/4	Reddish brown	Pgr	Dry till w/ numerous clasts, subangular
98HJB0170	98HJB0070	55M	15	418395	7045281	Tp (Mn)	sandy	Till	45	7.5YR 5/3	Brown	Q	Red silty till patches present
98STP0028	98HJB0071	55M	15	418034	7019288	Tp (Tr)	sandy	Till	55	7.5YR 5/2	Brown	Pgr	Dry till w/numerous clasts; subangular; roots throughout
98HJB0172	98HJB0072	55M	15	401934	7019946	R/Tr	silty-sand	Till	45	10YR 5/3	Brown	Agn	Clasts angular to subangular
98STP0029	98HJB0073	55M	15	406756	7018591	Tr	sandy	Till	50	5YR 5/3	Reddish brown	Agn	Large pebbles at base, subrounded. Near felsenmeer.
98HJB0171	98HJB0074	55M	15	410839	7018659	Tr	sandy	Diamicton	25-35	7.5YR 4/3	Brown	Agn/Agq	Collected f. fresh mudboil within Rogen moraine. High organic content.
98HJB0190	98HJB0075	55M	15	412588	7056979	Tp	silty	Till	45	2.5YR5/4	Reddish brown	Av	Till plain slopes gently upward to beach deposit. Composite sample.

***Definition of terms:**

Quaternary Unit (from Aylsworth et al, (1981)

Mn	Nearshore sediments; generally well sorted sand, gravel, cobbles or boulders deposited as beaches, bars, spits, and ice pushed ridges
AM	Alluvium and marine sand or silt, undifferentiated
Tp	Till plain
Ts	Till plain; prominent striped pattern on airphotos
Tr	Ribbed (Rogen) moraine; bouldery till forming hummocks and straight to sinuous ridges oriented perpendicular to ice flow; forms trains parallel to ice flow
Th	Hummocky till; lacks significant boulder cover; occurs as hummocks
R/T	Surface comprises 20 to 80% outcrop and is mantled with an average of <1m of till

Underlying Lithology (from Tella et al, 1997)

Q	Quaternary; glacial, fluvial and marine deposits
Pgr	Paleoproterozoic; granite, massive to weakly cleaved, pink-salmon, equigranular to porphyritic, may contain disseminated magnetite and fluorite
Agn	Layered to banded hornblende-biotite orthogneiss; includes discontinuous layers of garnet and biotite, in part contains xenoliths of metamafic rocks
Ag	K-feldspar, augen granite; in part characterized by quartz-ribbon mylonite
Agq	Quartz diorite to granite plutons; grey to pale pink, massive to weakly foliated centres, and well foliated migmatic margins; abundant paragneiss and amphobolite bands/layers at the margins (agmatitic); locally contain fine grained disseminated magnetite and remnants of banded iron formation.
As	Metasedimentary rocks: garnet and biotite, +/- staurolite, +/- andalusite, +/- kyanite, +/ sillimanite, +/- cordierite, +/- muscovite paragneiss; metamorphosed quartz-magnetite banded iron formations, migmatite, diatexite.
Av	Basalt to andesite, massive to pillowed flows, pillw breccia; for the most part metamorphosed to hornblende and garnet-chlorite schists and amohibolite
Afv	Intermediate to felsic flows, lapilli tuffs, pyroclastics and minor gabbro sills.

Additional samples (55M)

Station No.	Sample No.	NTS	UTM Zone	UTM Easting	UTM Northing	Quaternary Unit	Texture	Sediment Type	Depth (cm)	Munsell Colour		Underlying Lithology	Field Observations/Comments
										Colour	Description		
98HJB0099	98HJB0001	55M	15	359502	7062354		silty clay	Till	45	10R 4/4	weak red	granitoid	composite sample (2); red brown silty clay diamicton with inclusions of red clayey diamicton
98HJB0100	98HJB0002	55M	15	361528	7058283		silty	Till	40	2.5YR 6/4	light reddish brown	granitoid	Composite sample (2); silty diamicton; water content high in one hole
98HJB0103	98HJB0003	55M	15	444379	7049258		sandy	Till	40-45	2.5Y 5/2	Greyish brown	mafic volc.	Samples taken near iron formation in bedrock depression
98HJB0103	98HJB0004	55M	15	444294	7049731		silty	Till	43	10Y 4/3	Brown	mafic volc.	marine sediment with shells present at lower elevations
98HJB0103	98HJB0005	55M	15	444321	7049231		sandy	Till	35	7.5YR 5/2	Brown	mafic volc.	
98HJB0111	98HJB0006	55M	15	392048	7085926		sandy	Till	40	7.5YR 6/3	light brown	Kasan Fm.	Composite sample(2); one sticky, one loose
98HJB0112	98HJB0007	55M	15	395508	7082536		sandy	Till	45-50	2.5YR 5/4	reddish brown	Kasan Fm.	Composite sample (2); thick (15-20cm) organic covering in area, small shrubs, lichen & moss
98HJB0113	98HJB0008	55M	15	399318	7077575		sandy	Till	45	10YR 6/2	brown	granitoid	Composite sample (2)
98HJB0114	98HJB0009	55M	15	401439	7073536		silty	Till	45	10YR 6/3	Pale brown	granitoid	Composite sample (2); moderately pebbly, sticky, some pebbles appear rounded

Soil Profiles
Sediment sample Locations and Descriptions

Section 1:
Mudboil in till plain on east side of MacQuoid Lake; surface stoney; land rises slightly from lake
Sample pit dug to permafrost; sediment sandy, glaciomarine "reworked till"

Station No.	Sample No.	NTS	UTM			Texture	Sediment Type	Soil Horizon	Depth (cm)		Munsell Colour		Comments
			Zone	Easting	Northing				Top	Bottom	Colour	Description	
99HJB0055	99HJB0080	55M	15	418465	7028777	sandy diamicton	"reworked" till	carapace - A	0	10	10YR5/3	brown	0-25 cm, very sandy carapace - nearshore lacustrine sediment
99HJB0055	99HJB0081	55M	15	418465	7028777	sandy diamicton	"reworked" till	mudboil	10	20	7.5YR5/3	brown	sandy diamicton "washed" till
99HJB0055	99HJB0082	55M	15	418465	7028777	sandy diamicton	"reworked" till	mudboil	20	30	7.5YR4/3	brown	sandy diamicton "washed" till
99HJB0055	99HJB0083	55M	15	418465	7028777	sandy diamicton	"reworked" till	mudboil	30	40	7.5YR3/3	dk. brown	sandy diamicton "washed" till
99HJB0055	99HJB0084	55M	15	418465	7028777	sandy diamicton	"reworked" till	mudboil	40	50	7.5YR3/3	dk. brown	sandy diamicton "washed" till
99HJB0055	99HJB0085	55M	15	418465	7028777	sandy diamicton	"reworked" till	mudboil	50	60	7.5YR2.5/3	v. dk. brown	Mn oxide or organic lenses prevalent; associated with cobbles
99HJB0055	99HJB0086	55M	15	418465	7028777	sandy diamicton	"reworked" till	mudboil	60	70	7.5YR2.5/3	v. dk. brown	Mn oxide or organic lenses prevalent; associated with cobbles
99HJB0055	99HJB0087	55M	15	418465	7028777	sand	sand	mudboil	70	80	7.5YR5/3	brown	sandy, well sorted, injection feature, suggests sediment originally stratified

Section 2:
West of MacQuoid Lake in area of rogen moraine; landscape strewn with boulders up to several meters diameter
Few mudboils evident in area. Hole dug in mudboil ~2m diameter within boulder field

Station No.	Sample No.	NTS	UTM			Texture	Sediment Type	Soil Horizon	Depth (cm)		Munsell Colour		Comments
			Zone	Easting	Northing				Top	Bottom	Colour	Description	
99HJB0056	99HJB0088	55M	15	410731	7018245	sandy	"reworked" till	mudboil - carapace	0	10	7.5YR5/3	brown	brown sandy carapace, thickness varies, hard, dry
99HJB0056	99HJB0089	55M	15	410731	7018245	sandy diamicton	till	mudboil	10	20	5YR6/3	lt. red brown	brown to red brown silty diamicton; wet, sticky; contortion evident; interfingering of red brown and brown till; very large boulders present on surface - predominantly granitoid; minor gneiss; weathered
99HJB0056	99HJB0090	55M	15	410731	7018245	sandy diamicton	till	mudboil	20	30	5YR5/3	red brown	
99HJB0056	99HJB0091	55M	15	410731	7018245	sandy diamicton	till	mudboil	30	40	5YR5/3	red brown	
99HJB0056	99HJB0092	55M	15	410731	7018245	sandy diamicton	till	mudboil	40	50	5YR5/4	red brown	
99HJB0056	99HJB0093	55M	15	410731	7018245	sandy diamicton	till	mudboil	50	60	5YR5/3	red brown	

Section 3:
Stripped till plain west of MacQuoid Lake above marine limit; very few cobbles (no boulders) on surface of landscape
Section taken from hole dug in mudboil ~ 1m diameter

Station No.	Sample No.	NTS	UTM			Texture	Sediment Type	Soil Horizon	Depth (cm)		Munsell Colour		Comments
			Zone	Easting	Northing				Top	Bottom	Colour	Description	
99HJB0061	99HJB0098	55M	15	401971	7041885	sandy diamicton	"reworked" till	mudboil - carapace	0	10	7.5YR5/3	brown	brown sandy carapace, thickness varies, hard, dry
99HJB0061	99HJB0099	55M	15	401971	7041885	silty sand diamicton	till	mudboil	10	20	5YR5/3	reddish brown	red brown silty diamicton interfingered with brown silty diamicton; relationship unclear; sticky, wet, stoney, pebbles may be rounded to subrounded; rounded quartzite clasts common
99HJB0061	99HJB0100	55M	15	401971	7041885	silty sand diamicton	till	mudboil	20	30	5YR4/3	reddish brown	
99HJB0061	99HJB0101	55M	15	401971	7041885	silty sand diamicton	till	mudboil	30	40	5YR5/3	reddish brown	
99HJB0061	99HJB0102	55M	15	401971	7041885	silty sand diamicton	till	mudboil	40	50	5YR5/3	reddish brown	
99HJB0061	99HJB0103	55M	15	401971	7041885	silty sand diamicton	till	mudboil	50	60	5YR5/3	reddish brown	
99HJB0061	99HJB0104	55M	15	401971	7041885	silty sand diamicton	till	mudboil	60	70	5YR5/3	reddish brown	

Appendix 3:
Esker Sample Locations and Descriptions

Date -	Date collected	
Size Fraction -	>2<13 mm -	size range; sieved at collection site
	bulk -	no sieving at site; bulk reworked sediment collected

Appendix 3:
Esker Sample Locations and Descriptions

Station No.	Sample No	NTS	UTM			Size fraction	Comments
			Zone	Easting	Northing		
98HJB 0180	98HJB 1023	55M	15	416791	7015228	>2 <13	Reworked esker sediment (beach)
98HJB 0181	98HJB 1024	55M	15	414513	7018854	>2 <13	bouldery surface; sample collected f. reworked sediment (beach)
98HJB 0182	98HJB 1025	55M	15	413857	7022949	>2 <13	topography on esker decreases, beach deposits sampled
98HJB 0185	98HJB 1026	55M	15	411694	7035994	>2 <13	Beach deposits sampled; pebbly; clasts subangular to subrounded
98HJB 0186	98HJB 1027	55M	15	410844	7040963	>2 <13	Beach deposits sampled; angular clasts
98HJB 0187	98HJB 1028	55M	15	410700	7048510	>2 <13	Esker segment on lakeshore completely reworked; sampled collected f. edge of frost crack
98HJB 0188	98HJB 1029	55M	15	408850	7051800	>2 <13	Esker completely reworked; sample collected from beach ridge
98HJB 0189	98HJB 1030	55M	15	408296	7055564	>2 <13	Very flat boulder beach deposit; esker completely subdued.
98HJB 0191	98HJB 1031	55M	15	407626	7060833	>2 <13	Esker segment on lakeshore, completely reworked; sample collected f. beach ridges
98HJB 0192	98HJB 1032	55M	15	405746	7066008	>2 <13	Collected f. pebbly sand beach.
99HJB0057	99HJB 0094	55M	15	410183	7020684	bulk	reworked esker sediment
99HJB0058	99HJB 0095	55M	15	406987	7022889	bulk	reworked esker sediment; collected from deflation zone at side of esker
99HJB0059	99HJB 0096	55M	15	403893	7026059	bulk	reworked esker sediment; collected from deflation zone at side of esker
99HJB0060	99HJB 0097	55M	15	400390	7031077	bulk	reworked esker sediment
99HJB0062	99HJB 0105	55N	15	486322	7073313	bulk	reworked esker sediment

Appendix 4:
Geochemistry of Regional Sediment Samples (<0.002mm size fraction)

Sample preparation: Centrifuge and decantation
Analytical preparation: Nitric-aqua regia partial leach

Element	Unit	Analytical Method	Detection Limit	Upper Limit
Ag	ppm	ICP-AES	0.2	100
Al	%	ICP-AES	0.01	15
As	ppm	ICP-AES	2	10000
Ba	ppm	ICP-AES	10	10000
Be	ppm	ICP-AES	0.5	100
Bi	ppm	ICP-AES	2	10000
Ca	%	ICP-AES	0.01	15
Cd	ppm	ICP-AES	0.5	500
Co	ppm	ICP-AES	1	10000
Cr	ppm	ICP-AES	1	10000
Cu	ppm	ICP-AES	1	10000
Fe	%	ICP-AES	0.01	15
Ga	ppm	ICP-AES	10	10000
Hg	ppm	ICP-AES	1	10000
K	%	ICP-AES	0.01	10
La	ppm	ICP-AES	10	10000
Mg	%	ICP-AES	0.01	15
Mn	ppm	ICP-AES	5	10000
Mo	ppm	ICP-AES	1	10000
Na	%	ICP-AES	0.01	10
Ni	ppm	ICP-AES	1	10000
P	ppm	ICP-AES	10	10000
Pb	ppm	ICP-AES	2	10000
Sb	ppm	ICP-AES	2	10000
Sc	ppm	ICP-AES	1	10000
Sr	ppm	ICP-AES	1	10000
Ti	%	ICP-AES	0.01	10
Tl	ppm	ICP-AES	10	10000
U	ppm	ICP-AES	10	10000
V	ppm	ICP-AES	1	10000
W	ppm	ICP-AES	10	10000
Zn	ppm	ICP-AES	2	10000
Hg	ppb	AAS-cold vapour	10	100000

Appendix 4: Till Geochemistry (<0.002mm)

Regional Samples (55M/7 and M/10)

Sample No.	Ag	Al	As	Ba	Be	Bi	Ca	Cd	Co	Cr	Cu	Fe	Ga	Hg	K	La	Mg	Mn	Mo	Na	Ni	P	Pb	Sb	Sc	Sr	Ti	Tl	U	V	W	Zn	LOI
	ppm	%	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	%	ppm	ppb	%	ppm	%	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	%
98HJB 0010	<2	2.22	10	190	0.5	<2	0.27	<.5	11	48	38	3.76	<10	<10	0.39	70	0.97	360	2	0.39	28	3040	24	<2	5	136	0.05	<10	<10	41	<10	74	3
98HJB 0011	<2	2.02	10	180	0.5	<2	0.31	<.5	11	53	29	3.75	<10	20	0.29	80	0.82	310	3	0.77	26	8110	22	<2	5	131	0.05	<10	<10	48	<10	58	5.2
98HJB 0012	<2	2.79	12	230	1	<2	0.35	<.5	14	51	39	4.28	10	<10	0.62	70	1.12	790	2	0.38	31	1940	20	<2	7	127	0.09	<10	<10	50	<10	88	3.6
98HJB 0013	<2	3.05	6	210	1	<2	0.4	<.5	17	58	44	4.4	10	<10	0.77	70	1.31	615	1	0.44	35	2700	18	<2	7	117	0.1	<10	<10	54	<10	98	3
98HJB 0014	<2	3.36	14	290	1.5	<2	0.32	<.5	14	78	65	4.08	10	10	0.86	70	1.33	425	<1	0.35	38	1470	26	<2	6	161	0.08	<10	<10	51	<10	90	4
98HJB 0015	<2	2.49	14	190	0.5	<2	0.36	<.5	12	50	42	3.81	10	<10	0.44	70	0.97	365	2	0.35	28	2370	24	<2	6	184	0.07	<10	<10	44	<10	70	3
98HJB 0016	<2	2.53	12	250	1	<2	0.35	<.5	15	53	39	4.02	10	30	0.38	80	0.88	490	1	0.76	30	3630	26	<2	7	120	0.08	<10	<10	49	<10	66	13.6
98HJB 0017	<2	1.97	8	160	0.5	<2	0.46	<.5	14	48	30	4.16	10	10	0.32	90	0.85	550	1	0.42	26	3660	26	2	6	145	0.1	<10	<10	47	<10	62	3.2
98HJB 0018	<2	1.48	14	290	1	<2	0.22	<.5	11	60	31	2.67	<10	40	0.12	90	0.38	510	1	1.23	23	>10000	20	<2	2	106	0.03	<10	<10	28	<10	30	17
98HJB 0019	<2	2.83	16	300	1	<2	0.31	<.5	15	52	42	3.81	10	10	0.55	70	1.15	575	1	0.37	31	1490	22	<2	7	105	0.08	<10	<10	46	<10	82	4
98HJB 0020	<2	3.25	18	340	1.5	<2	0.32	<.5	17	58	74	4.42	10	10	0.68	70	1.24	575	1	0.47	36	2120	32	2	9	108	0.06	<10	<10	50	<10	106	4.2
98HJB 0021	<2	3.5	10	280	1	<2	0.37	<.5	14	61	49	4.2	10	10	0.76	70	1.33	445	<1	0.48	33	3010	22	<2	6	147	0.08	<10	<10	51	<10	92	3.6
98HJB 0022	<2	2.23	20	200	0.5	<2	0.38	<.5	12	53	39	3.74	10	10	0.39	90	0.95	410	2	0.39	20	2820	26	<2	5	226	0.08	<10	<10	44	<10	62	2.6
98HJB 0023	<2	2.6	12	170	1	<2	0.31	<.5	13	51	41	3.97	10	<10	0.49	80	0.91	490	3	0.39	31	3000	26	<2	5	207	0.06	<10	<10	44	<10	70	3
98HJB 0024	<2	3.55	20	310	1.5	<2	0.32	<.5	18	70	84	5.45	10	30	0.64	90	1.11	750	3	1.12	40	7200	34	<2	10	114	0.09	<10	<10	66	<10	100	10.6
98HJB 0025	<2	3.39	12	350	1	2	0.37	<.5	17	74	51	5.13	10	<10	0.96	90	1.55	585	3	0.42	41	1820	22	<2	8	89	0.16	<10	<10	72	<10	124	4
98HJB 0026	<2	2.98	12	240	1.5	<2	0.3	<.5	13	69	64	3.78	10	<10	0.6	80	1.15	360	1	0.43	37	2490	26	<2	7	203	0.07	<10	<10	48	<10	74	4
98HJB 0027	<2	2.67	12	230	1	<2	0.33	<.5	13	57	49	3.84	10	10	0.55	70	1.09	385	1	0.41	31	2440	26	<2	6	161	0.08	<10	<10	50	<10	80	3.4
98HJB 0028	<2	3.56	16	260	1.5	<2	0.26	<.5	14	75	77	3.91	10	10	0.74	80	1.31	370	2	0.41	40	1560	26	<2	8	203	0.06	<10	<10	49	<10	84	4.2
98HJB 0029	<2	2.88	10	260	1	<2	0.39	<.5	11	58	43	3.79	10	<10	0.6	70	1.24	350	<1	0.31	31	1800	20	<2	6	168	0.08	<10	<10	52	<10	78	2.8
98HJB 0030	<2	3.27	20	440	1.5	<2	0.33	<.5	16	57	84	4.19	10	10	0.7	70	1.28	495	1	0.34	37	1530	28	<2	9	119	0.07	<10	<10	52	<10	106	4
98HJB 0031	<2	2.97	14	400	1	<2	0.28	<.5	12	51	47	3.9	10	10	0.55	70	1.05	355	1	0.38	28	1910	24	6	7	160	0.04	<10	<10	48	<10	72	4
98HJB 0032	<2	2.28	10	200	1	<2	0.35	<.5	12	47	38	3.62	10	<10	0.49	80	1.01	435	<1	0.37	25	2430	22	<2	7	115	0.09	<10	<10	47	<10	82	3
98HJB 0033	<2	2.7	18	290	1	<2	0.24	<.5	11	47	34	3.57	10	<10	0.52	70	0.96	370	<1	0.37	24	2080	24	2	5	157	0.03	<10	<10	43	<10	64	4
98HJB 0034	<2	3.18	20	350	1.5	<2	0.29	<.5	15	66	60	4.07	10	10	0.66	80	1.29	450	3	0.51	32	2610	34	<2	8	138	0.06	<10	<10	62	<10	96	5.2
98HJB 0035	<2	2.64	8	350	1	<2	0.29	<.5	10	44	26	3.27	10	<10	0.5	70	0.96	335	2	0.27	22	1580	22	<2	5	210	0.04	<10	<10	40	<10	58	3.2
98HJB 0036	<2	2.68	12	270	1	<2	0.29	<.5	12	48	34	3.89	10	10	0.54	70	1.02	375	2	0.46	28	2520	20	<2	6	148	0.05	<10	<10	48	<10	70	4.8
98HJB 0037	<2	2.63	12	260	1	<2	0.27	<.5	10	47	26	3.47	10	<10	0.49	70	0.95	325	1	0.34	24	2270	22	<2	5	232	0.05	<10	<10	43	<10	60	3.8
98HJB 0038	<2	2.12	14	280	1	<2	0.28	<.5	11	44	29	3.68	10	<10	0.48	70	0.94	375	1	0.26	23	1500	18	<2	5	115	0.06	<10	<10	46	<10	74	3.6
98HJB 0039	<2	2.05	8	240	0.5	<2	0.26	<.5	10	41	35	3.32	<10	<10	0.37	70	0.88	330	<1	0.32	24	2230	20	4	5	155	0.04	<10	<10	38	<10	64	3.6
98HJB 0040	<2	2.64	14	260	1	<2	0.29	<.5	12	48	36	3.78	10	<10	0.51	70	1.06	470	2	0.34	27	1790	24	<2	6	132	0.05	<10	<10	47	<10	72	3.8
98HJB 0041	<2	2.42	10	360	1	<2	0.3	<.5	9	42	35	3.22	10	<10	0.46	70	0.93	310	1	0.3	22	1990	20	<2	5	190	0.05	<10	<10	40	<10	60	3
98HJB 0042	<2	2.86	10	230	1	<2	0.34	<.5	12	51	35	4.01	10	<10	0.65	70	1.11	470	2	0.37	28	2260	22	<2	6	155	0.07	<10	<10	50	<10	80	2.8
98HJB 0043	<2	3.1	12	270	1.5	<2	0.27	<.5	12	53	40	3.77	10	10	0.65	70	1.1	425	1	0.38	30	2010	22	2	6	175	0.05	<10	<10	50	<10	70	4
98HJB 0044	<2	2.63	10	200	1	<2	0.3	<.5	12	50	30	3.81	10	<10	0.54	70	1.01	355	3	0.29	26	1730	20	<2	6	160	0.07	<10	<10	49	<10	72	2.6
98HJB 0045	<2	1.85	12	180	0.5	<2	0.39	<.5	10	50	22	3.57	<10	<10	0.29	90	0.79	355	1	0.38	23	3570	26	<2	5	290	0.08	<10	<10	47	<10	48	3.4
98HJB 0046	<2	2.81	14	510	1	<2	0.39	<.5	11	45	23	3.97	10	<10	0.71	90	1.15	385	1	0.29	24	1810	18	<2	5	165	0.09	<10	<10	52	<10	82	2.8
98HJB 0047	<2	2.53	10	360	1	<2	0.26	<.5	9	51	24	2.99	<10	<10	0.43	70	0.91	245	1	0.34	25	2160	18	<2	5	234	0.03	<10	<10	40	<10	50	4.6
98HJB 0048	<2	1.87	4	350	1	<2	0.23	<.5	9	43	23	3.05	<10	<10	0.36	60	0.89	205	1	0.27	21	1560	20	4	4	121	0.02	<10	<10	37	<10	54	3
98HJB 0049	<2	2.73	14	200	1.5	<2	0.25	<.5	11	54	45	3.3	10	10	0.47	70	1	415	<1	0.35	29	1770	28	2	6	195	0.04	<10	<10	50	<10	60	4.8
98HJB 0050	<2	2.35	10	320	1	<2	0.25	<.5	9	44	25	3.3	10	<10	0.44	70	0.9	310	1	0.29	21	1660	22	<2	5	169	0.04	<10	<10	40	<10	60	3.4
98HJB 0051	<2	2.11	8	320	1	<2	0.26	<.5	10	42	28	3.06	<10	<10	0.4	60	0.89	290	1	0.29	21	1780	18	<2	4	161	0.04	<10	<10	37	<10	56	3.2
98HJB 0052	<2	2.82	<2	420	1.5	<2	0.35	<.5	16	63	31	4.18	10	<10	0.57	80	1.25	560	1	0.33	34	1730	30	<2	6	135	0.07	<10	<10	57	<10	90	4.2
98HJB 0054	<2	3.49	18	170	1.5	<2	0.18	<.5	16	174	34	9.99	10	20	0.6	60	1.22	390	12	1.2	43	>10000	30	4	6	82	0.05	<10	<10	104	<10	98	13.8
98HJB 0056	<2	3.2	22	250	1.5	<2	0.24	<.5	14	58	73	4.72	10	<10	0.55	70	1.1	440	1	0.4	31	2140	34	<2	8	175	0.04	<10	<10	49	<10	94	3.8
98HJB 0057	<2	2.84	10	240	1.5	<2	0.34	<.5	12	64	46	3.7	10	<10	0.5	70	1.08	345	1	0.35	31	2250	26	<2	6	291	0.06	<10	<10	46	<10	68	4.4
98HJB 0059	<2	2.32	2	190	1	<2	0.38	<.5	11	59	38	3.87	<10	<10	0.43	90	0.97	320	1	0.34	29	2600	24	2	5	313	0.08	<10	<10	48	<10	60	3.8
98HJB 0060	<2	2.76	6	270	1	<2	0.35	<.5	12	52	46	4.04	10	<10	0.46	80	1.07	380	<1	0.36	30	2450	28	<2	6	248	0.06	<10	<10	44	<10	76	2.8
98HJB 0061	<2	3.8	10	230	1.5	<2	0.19	<.5	14	83	42	5.17	10	10	0.39	80	1.09	230	<1	0.52	36	2550	34	<2	7	226	0.06	<10	<10	78	<10	62	9.8
98HJB 0062	<2	3.63	10	470	1.5	<2	0.38	<.5	15	64	57	4.95	10	<10	0.79	80	1.37	480	1	0.45	33	2290	28	2	8	189	0.08	<10	<10	55	<10	104	3.2
98HJB 0063	<2	3.03	8	310	1.5	<2	0.37	<.5	13	59	30	3.65	10	<10	0.54	80	1.12	410	<1	0.32	30	1970	26	<2	5	303	0.06	<10	<10	44	<10	68	3.6
98HJB 0064	<2	2.56	8	300	1	<2	0.34	<.5	11	49	47	3.7	10	<10	0.53	80	1.1	370	1	0.39	28	2240	22	<2	5	151	0.06	<10	<10	47	<10	72	3.2
98HJB 0065	<2	2.62	14	520	1.5	<2	0.32	<.5	10	59	51	3.54	10	10	0.59	70	1.01	320	1	0.38	28	2070	18	2	7	191	0.07	<10	<10	50	<10	66	3.6
98HJB 0066	<2	2.62	6	280	1	<2	0.32	<.5	11	48	48	3.74	10	<10	0.64	70	1.04	350	4	0.35	25	1760	18	<2	6	134	0.08	<10	<10	50	<10	78	3.4
98HJB 0067	<2	2.34	6	220	1	<2	0.35	<.5	9	56	40	3.15	<10	<10	0.57	80	1.02	280	1	0.35	26	2160	16	6	6	174	0.08	<10	<10	46	<10	62	2.6
98HJB 0068	<2	2.27	12	250	1	<2	0.31	<.5	12	45	49	3.47	10	<10	0.52	70	0.95	445	1	0.35	26	1980	20	2	6	129	0.07	<10	<10	43	<10	70	3
98HJB 0069	<2	2.2	10	400	1	<2	0.29	<.5	11	47	46	3.35	<10	10	0.47	70	0.89	370	3	0.44	24	2600	20	<2	6	151	0.06	<10	<10	45	<10	62	4
98HJB 0070	<2	2.46	12	270	1	<2	0.27	<.5	11	48	39	3.84	10	<10	0.56	70	0.95	395	2	0.38	24	1970	22	2	6	119	0.07	<10	<10	51	<10	76	3.2
98HJB 0071	<2	2.15	4	200	0.5	<2	0.37	<.5	10	51	33	2.86	<10	80	0.44	70	0.98	315	1	0.31	26	2290	18	<2	5	208	0.08	<10	<10	43	<10	58	3.4
98HJB 0072	<2	2.3	14	230	1	<2	0.26	<.5	14	65	45	3.76	10	20	0.39	70	0.97	420	1	0.62	36	4360	24	<2	6	205	0.07	<10	<10	58	<10	58	7.8
98HJB 0073	<2	2.6	10	220	1.5	<2	0.28	<.5	10	55	33	3.31	10	10	0.48	70	0.94	290	1	0.45	28	3120	24	<2	6	256	0.04	<10	<10	46	<10	54	4.8
98HJB 0074	<2	1.9	10	170	1	<2	0.27	<.5	10	55	79	3.01	<10	30	0.31	80	0.71	300	1	0.55	29	3220	20	2	6	197	0.07	<10	<10	44	<10	46	10
98HJB0075	<2	2.7	14	310	1	<2	0.28	<.5	12	48	32	3.49	10	<10	0.51	60	1.17	405	1	0.36	28	2120	22	<2	5	133	0.03	<10	<10	39	<10	74	3.4

Appendix 4: Till Geochemistry (<0.002mm)

Additional samples (55M)

Sample No.	Ag	Al	As	Ba	Be	Bi	Ca	Cd	Co	Cr	Cu	Fe	Ga	Hg	K	La	Mg	Mn	Mo	Na	Ni	P	Pb	Sb	Sc	Sr	Ti	Tl	U	V	W	Zn	LOI
	ppm	%	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	%	ppm	ppb	%	ppm	%	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	%
98HJB 0001	<2	1.84	10	230	1	<2	0.18	<5	9	44	17	2.78	<10	<10	0.3	60	0.63	265	1	0.33	25	2500	24	<2	4	246	0.01	<10	<10	32	<10	34	4
98HJB 0002	<2	1.72	12	260	1	<2	0.23	<5	9	46	19	2.94	<10	<10	0.29	60	0.62	310	<1	0.43	23	4250	20	2	4	272	0.02	<10	<10	34	<10	36	3.8
98HJB 0003	<2	3.4	18	240	0.5	<2	0.47	<5	22	86	120	5.02	10	10	0.72	70	1.6	720	3	0.49	58	2270	18	<2	8	93	0.18	<10	<10	76	<10	104	4
98HJB 0004	<2	3.05	20	190	0.5	<2	0.38	<5	27	60	104	5.13	10	20	0.37	60	1.18	735	1	0.44	40	2470	18	<2	6	83	0.14	<10	<10	80	<10	88	13
98HJB 0005	<2	3.03	8	240	0.5	<2	0.57	<5	27	77	100	5.01	10	10	0.61	70	1.46	795	3	0.46	55	2690	20	<2	7	107	0.16	<10	<10	73	<10	90	5.4
98HJB 0006	<2	1.75	8	300	0.5	<2	0.39	<5	10	43	20	3.75	<10	<10	0.27	90	0.86	350	1	0.66	21	7470	24	<2	4	199	0.05	<10	<10	39	<10	54	2.8
98HJB 0007	<2	2.67	26	280	1.5	<2	0.23	<5	14	49	78	4.03	10	10	0.51	50	1.15	415	2	0.39	34	1910	26	<2	8	87	0.03	<10	<10	41	<10	100	4.6
98HJB 0008	<2	1.81	14	160	0.5	<2	0.35	<5	12	48	31	3.75	<10	10	0.28	90	0.86	325	1	0.65	27	7000	24	<2	5	175	0.06	<10	<10	46	<10	66	4.2
98HJB 0009	<2	2.66	10	340	1	<2	0.33	<5	16	56	46	4.69	10	10	0.58	70	1.19	610	4	0.44	33	2940	30	<2	6	138	0.08	<10	<10	58	<10	94	4

Appendix 5:
Geochemistry of Regional Sediment Samples (<0.063mm size fraction)

Sample preparation: Dry sieve; <230 mesh screen
ICP-AES Analytical preparation: Nitric-aqua regia partial leach

Element	Unit	Analytical Method	Detection Limit	Upper Limit
Au	ppb	FA-ICP-AFS	2	10000 ppb
Pt	ppb	FA-ICP-AFS	5	10000 ppb
Pd	ppb	FA-ICP-AFS	2	10000 ppb
Ag	ppm	ICP-AES	0.2	0.01%
Al	%	ICP-AES	0.01	15%
As	ppm	ICP-AES	2	1%
Ba	ppm	ICP-AES	10	1%
Be	ppm	ICP-AES	0.5	0.01%
Bi	ppm	ICP-AES	2	1%
Ca	%	ICP-AES	0.01	15%
Cd	ppm	ICP-AES	0.5	0.05%
Co	ppm	ICP-AES	1	1%
Cr	ppm	ICP-AES	1	1%
Cu	ppm	ICP-AES	1	1%
Fe	%	ICP-AES	0.01	15%
Ga	ppm	ICP-AES	10	1%
K	%	ICP-AES	0.01	10%
La	ppm	ICP-AES	10	1%
Mg	%	ICP-AES	0.01	15%
Mn	ppm	ICP-AES	5	1%
Mo	ppm	ICP-AES	1	1%
Na	%	ICP-AES	0.01	10%
Ni	ppm	ICP-AES	1	1%
P	ppm	ICP-AES	10	1%
Pb	ppm	ICP-AES	2	1%
Sb	ppm	ICP-AES	2	1%
Sc	ppm	ICP-AES	1	1%
Sr	ppm	ICP-AES	1	1%
Ti	%	ICP-AES	0.01	10%
Tl	ppm	ICP-AES	10	1%
U	ppm	ICP-AES	10	1%
V	ppm	ICP-AES	1	1%
W	ppm	ICP-AES	10	1%
Zn	ppm	ICP-AES	2	1%

Appendix 5: Till Geochemistry (<0.063 mm)

Regional Samples (55M/7 and M/10)

Sample No.	Au	Pt	Pd	Ag	Al	As	Ba	Be	Bi	Ca	Cd	Co	Cr	Cu	Fe	Ga	Hg	K	La	Mg	Mn	Mo	Na	Ni	P	Pb	Sb	Sc	Sr	Tl	Ti	U	V	W	Zn	LOI
	ppb	ppb	ppb	ppm	%	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	%	ppm	ppb	%	ppm	%	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	%
98HJB 0010	<2	<5	<2	<2	0.6	<2	110	<.5	<2	0.26	<.5	3	15	8	1.2	<10	<10	0.09	30	0.28	120	1	<.01	6	660	8	<2	1	68	0.04	<10	<10	15	<10	18	1
98HJB 0011	<2	<5	<2	<2	0.3	<2	40	<.5	<2	0.24	<.5	1	9	3	0.73	<10	<10	0.03	20	0.15	60	1	<.01	4	640	2	<2	1	44	0.03	<10	<10	10	<10	10	0.4
98HJB 0012	<2	<5	<2	<2	0.69	<2	150	<.5	<2	0.29	<.5	5	17	10	1.45	<10	<10	0.13	30	0.33	200	1	0.01	9	710	6	<2	2	42	0.04	<10	<10	17	<10	24	1
98HJB 0013	<2	<5	<2	<2	0.89	6	190	<.5	<2	0.37	<.5	6	20	13	1.7	<10	<10	0.19	30	0.44	240	<1	0.01	12	750	10	<2	2	46	0.05	<10	<10	21	<10	30	1
98HJB 0014	<2	<5	2	<2	1.23	4	230	0.5	<2	0.31	<.5	6	32	24	1.71	<10	<10	0.3	30	0.52	190	1	0.01	16	630	12	<2	3	67	0.04	<10	<10	22	<10	32	1.8
98HJB 0015	22	<5	<2	<2	0.44	<2	90	<.5	<2	0.26	<.5	2	11	6	0.99	<10	<10	0.06	30	0.18	90	1	<.01	5	660	6	<2	1	58	0.03	<10	<10	12	<10	12	1
98HJB 0016	<2	<5	2	<2	0.51	4	140	<.5	<2	0.3	<.5	4	14	6	1.28	<10	<10	0.06	30	0.23	155	<1	<.01	7	690	2	<2	1	48	0.05	<10	<10	16	<10	16	1.4
98HJB 0017	<2	<5	4	<2	0.43	2	70	<.5	<2	0.3	<.5	3	11	4	1.15	<10	<10	0.05	30	0.21	125	<1	<.01	5	680	6	<2	1	46	0.05	<10	<10	14	<10	14	0.4
98HJB 0018	<2	<5	4	<2	0.23	2	60	<.5	<2	0.17	<.5	1	8	1	0.66	<10	<10	0.01	10	0.09	75	<1	<.01	3	560	2	<2	<1	29	0.02	<10	<10	9	<10	6	1.2
98HJB 0019	<2	<5	<2	<2	0.76	10	150	<.5	<2	0.29	<.5	4	16	10	1.36	<10	<10	0.12	30	0.31	175	1	0.01	9	660	4	<2	2	55	0.04	<10	<10	17	<10	20	0.4
98HJB 0020	<2	<5	4	<2	1.56	8	300	0.5	<2	0.36	<.5	7	27	32	2.12	<10	<10	0.3	40	0.55	230	1	0.01	16	600	12	<2	5	54	0.04	<10	<10	25	<10	44	1.6
98HJB 0021	<2	<5	<2	<2	1.19	2	230	<.5	<2	0.3	<.5	5	22	18	1.71	<10	<10	0.23	30	0.48	180	1	0.01	12	560	4	<2	3	52	0.03	<10	<10	20	<10	32	1.2
98HJB 0022	<2	<5	2	<2	0.42	2	80	<.5	<2	0.27	<.5	3	14	5	1.02	<10	10	0.06	30	0.22	100	<1	<.01	6	690	2	<2	1	67	0.03	<10	<10	13	<10	12	0.4
98HJB 0023	<2	<5	4	<2	0.71	6	140	<.5	<2	0.26	<.5	4	16	10	1.36	<10	<10	0.11	40	0.28	150	<1	<.01	9	680	8	<2	1	82	0.04	<10	<10	16	<10	20	1
98HJB 0024	<2	<5	2	<2	0.32	6	60	<.5	<2	0.19	<.5	2	9	7	0.8	<10	<10	0.04	10	0.17	100	<1	<.01	5	480	4	<2	<1	18	0.02	<10	<10	10	<10	12	0.8
98HJB 0025	<2	<5	<2	<2	1.24	4	180	<.5	<2	0.32	<.5	8	30	19	2.26	<10	<10	0.31	50	0.64	285	1	0.02	17	620	12	<2	3	40	0.07	<10	<10	29	<10	46	1.4
98HJB 0026	<2	<5	2	<2	0.58	6	130	<.5	<2	0.28	<.5	3	19	11	1.22	<10	<10	0.1	30	0.27	95	<1	<.01	9	770	6	<2	1	68	0.03	<10	<10	16	<10	16	0.4
98HJB 0027	<2	<5	<2	<2	0.59	4	90	<.5	<2	0.26	<.5	3	16	10	1.19	<10	<10	0.1	30	0.26	110	<1	<.01	7	640	8	<2	1	57	0.03	<10	<10	15	<10	18	0.4
98HJB 0028	<2	<5	<2	<2	1.55	8	260	0.5	<2	0.34	<.5	6	33	32	1.91	<10	<10	0.29	40	0.55	160	<1	0.01	18	680	14	<2	4	93	0.04	<10	<10	24	<10	34	1.6
98HJB 0029	14	<5	2	<2	1.08	2	170	<.5	<2	0.31	<.5	5	21	14	1.57	<10	<10	0.19	30	0.43	140	<1	0.01	11	620	6	<2	2	70	0.04	<10	<10	20	<10	26	0.6
98HJB 0030	<2	<5	2	<2	1.7	8	300	0.5	<2	0.33	<.5	8	27	41	2.19	<10	<10	0.33	30	0.59	215	1	0.01	18	510	10	<2	5	55	0.04	<10	<10	24	<10	48	2.8
98HJB 0031	<2	10	8	<2	0.99	6	240	<.5	<2	0.24	<.5	4	20	14	1.42	<10	<10	0.16	30	0.35	155	1	0.01	11	520	14	<2	2	56	0.02	<10	<10	16	<10	24	1.4
98HJB 0032	<2	<5	2	<2	0.44	8	100	<.5	<2	0.25	<.5	4	12	7	1.17	<10	<10	0.07	30	0.22	130	<1	<.01	6	640	6	<2	1	36	0.03	<10	<10	14	<10	16	0.6
98HJB 0033	<2	<5	2	<2	1.19	4	260	<.5	<2	0.28	<.5	5	20	13	1.63	<10	<10	0.2	40	0.4	175	1	0.01	10	610	8	<2	2	86	0.03	<10	<10	19	<10	24	1.2
98HJB 0034	<2	<5	<2	<2	0.81	2	90	<.5	<2	0.32	<.5	5	20	13	1.51	<10	<10	0.14	30	0.38	165	1	0.01	10	720	8	<2	2	60	0.04	<10	<10	18	<10	26	1.2
98HJB 0035	<2	<5	<2	<2	1	6	250	<.5	<2	0.29	<.5	4	20	11	1.53	<10	<10	0.17	40	0.37	155	1	0.01	9	670	10	<2	2	89	0.03	<10	<10	18	<10	24	1
98HJB 0036	<2	<5	<2	<2	0.88	6	200	<.5	<2	0.31	<.5	5	21	11	1.5	<10	<10	0.14	40	0.38	160	1	0.01	10	630	6	<2	2	68	0.04	<10	<10	18	<10	24	1.6
98HJB 0037	<2	<5	<2	<2	0.81	<2	230	<.5	2	0.24	<.5	4	18	10	1.43	<10	<10	0.13	30	0.33	155	<1	<.01	9	630	12	<2	1	72	0.01	<10	<10	16	<10	22	1.4
98HJB 0038	<2	<5	<2	<2	0.96	<2	210	<.5	<2	0.27	<.5	5	21	12	1.81	<10	<10	0.19	40	0.43	220	1	<.01	11	670	8	<2	2	61	0.04	<10	<10	21	<10	32	2
98HJB 0039	<2	<5	2	<2	0.53	<2	140	<.5	<2	0.24	<.5	3	13	8	1.17	<10	<10	0.08	30	0.23	120	<1	<.01	7	650	6	<2	1	64	0.02	<10	<10	13	<10	16	0.4
98HJB 0040	<2	<5	4	<2	0.97	4	190	<.5	<2	0.28	<.5	5	19	13	1.56	<10	<10	0.17	30	0.38	230	1	0.01	10	600	8	<2	2	60	0.03	<10	<10	18	<10	26	1.2
98HJB 0041	<2	<5	<2	<2	0.61	6	140	<.5	<2	0.24	<.5	3	13	8	1.12	<10	<10	0.1	30	0.24	105	1	<.01	6	590	8	<2	1	69	0.03	<10	<10	13	<10	16	0.4
98HJB 0042	<2	<5	<2	0.2	1.02	8	190	<.5	<2	0.29	<.5	4	19	12	1.6	<10	<10	0.2	30	0.38	160	1	0.01	9	610	10	<2	3	64	0.04	<10	<10	19	<10	26	1.4
98HJB 0043	<2	<5	2	<2	1.39	4	260	0.5	<2	0.31	<.5	5	25	16	1.84	<10	<10	0.26	40	0.49	190	1	0.01	13	610	10	<2	3	85	0.03	<10	<10	22	<10	30	1.8
98HJB 0044	<2	<5	<2	<2	0.84	6	150	<.5	<2	0.27	<.5	3	18	10	1.48	<10	<10	0.14	30	0.32	125	1	<.01	9	640	6	<2	2	68	0.04	<10	<10	17	<10	24	0.4
98HJB 0045	<2	<5	<2	<2	0.35	4	50	<.5	<2	0.25	<.5	1	13	4	1.05	<10	<10	0.05	30	0.18	80	<1	0.01	5	700	8	<2	1	79	0.03	<10	<10	14	<10	10	0.4
98HJB 0046	<2	<5	2	<2	1.06	8	280	0.5	<2	0.37	<.5	6	20	11	1.9	<10	<10	0.25	40	0.47	220	1	0.01	11	750	10	<2	3	69	0.05	<10	<10	22	<10	34	0.2
98HJB 0047	<2	<5	<2	<2	1.13	6	260	0.5	<2	0.25	<.5	4	24	12	1.53	<10	<10	0.18	30	0.4	125	1	0.01	12	620	12	<2	2	93	0.01	<10	<10	18	<10	22	1.6
98HJB 0048	<2	<5	2	<2	1.04	6	330	0.5	<2	0.26	<.5	4	21	10	1.57	<10	<10	0.18	30	0.43	150	1	0.01	10	600	12	<2	2	83	0.02	<10	<10	18	<10	24	1.2
98HJB 0049	<2	<5	2	<2	0.93	6	120	<.5	<2	0.25	<.5	4	22	16	1.43	<10	<10	0.15	30	0.34	150	1	<.01	10	620	10	<2	2	80	0.03	<10	<10	19	<10	20	1.4
98HJB 0050	<2	<5	<2	1.25	6	310	0.5	<2	0.28	<.5	4	21	11	1.65	<10	<10	0.22	40	0.42	175	1	0.01	10	630	12	<2	3	103	0.03	<10	<10	19	<10	26	1.2
98HJB 0051	<2	<5	2	0.2	0.92	<2	180	<.5	<2	0.29	<.5	4	17	9	1.38	<10	<10	0.16	30	0.32	140	1	0.01	8	650	6	<2	2	96	0.03	<10	<10	17	<10	18	1
98HJB 0052	<2	<5	2	<2	1.45	10	250	0.5	<2	0.39	<.5	6	26	12	2.02	<10	<10	0.29	40	0.56	265	1	0.01	13	670	14	2	3	87	0.06	<10	<10	28	<10	36	1.8
98HJB 0054				<2	0.99	6	150	<.5	<2	0.29	<.5	7	95	13	3.65	<10	<10	0.14	30	0.57	190	8	0.01	51	790	14	<2	2	44	0.05	<10	<10	39	<10	40	3.8
98HJB 0056	<2	<5	<2	<2	1.12	12	150	<.5	<2	0.28	<.5	4	19	17	1.54	<10	<10	0.2	30	0.33	135	1	0.01	9	610	10	<2	3	80	0.03	<10	<10	19	<10	24	1.2
98HJB 0057	<2	<5	<2	<2	0.79	2	140	<.5	<2	0.29	<.5	3	20	11	1.34	<10	<10	0.13	30	0.28	110	<1	<.01	8	700	8	<2	2	104	0.04	<10	<10	18	<10	16	0.6
98HJB 0059	<2	<5	<2	<2	0.48	<2	50	<.5	<2	0.32	<.5	3	17	6	1.39	<10	<10	0.08	40	0.22	105	<1	0.01	6	820	14	<2	1	122	0.04	<10	<10	17	<10	12	0.4
98HJB 0060	<2	<5	2	<2	0.61	6	120	<.5	<2	0.29	<.5	3	14	8	1.21	<10	<10	0.09	30	0.25	120	<1	<.01	7	660	8	<2	1	83	0.04	<10	<10	14	<10	16	0.6
98HJB 0061	<2	<5	<2	<2	0.89	6	110	<.5	<2	0.2	<.5	3	22	9	1.58	<10	<10	0.08	40	0.33	80	1	<.01	9	480	10	<2	2	85	0.04	<10	<10	23	<10	18	3.2
98HJB 0062	<2	<5	2	<2	1.02	4	210	<.5	<2	0.31	<.5	4	18	13	1.53	<10	<10	0.2	30	0.37	150	1	0.01	9	590	8	<2	3	65	0.04	<10	<10	18	<10	26	0.8
98HJB 0063	<2	<5	<2	<2	0.99	2	190	<.5	<2	0.3	<.5	4	20	9	1.38	<10	<10	0.17	30	0.32	130	<1	0.01	8	640	6	<2	2	108	0.03	<10	<10	18	<10	18	1
98HJB 0064	<2	<5	2	<2	0.66	<2	150	<.5	<2	0.38	<.5	4	16	9	1.28	<10	<10	0.15	30	0.32	165	<1	0.01	8	620	8	<2	1	77	0.04	<10	<10	16	<10	18	0.4
98HJB 0065	<2	<5	<2	<2	0.98	<2	130	<.5	<2	0.32	<.5	3	20	12	1.39	<10	<10	0.18	30	0.31	120	<1	0.01	8	660	6	<2	2	97	0.05	<10	<10	19	<10	18	0.6
98HJB 0066	<2	<5	<2	<2	1.24	4	200	<.5	<2	0.37	<.5	4	21	15	1.73	<10	<10	0.25	40	0.42	150	<1	0.01	10	650	6	<2	3	80	0.05	<10	<10	22	<10	28	1
98HJB 0067	<2	<5	<2	<2	0.97	8	150	<.5	<2	0.35	<.5	4	22	11	1.46	<10	<10	0.18	30	0.34	120	1	0.01	10	700	10	<2	2	100	0.05	<10	<10	21	<10	20	1.2

Appendix 5: Till Geochemistry (<0.063 mm)

Sample No.	Au	Pt	Pd	Ag	Al	As	Ba	Be	Bi	Ca	Cd	Co	Cr	Cu	Fe	Ga	Hg	K	La	Mg	Mn	Mo	Na	Ni	P	Pb	Sb	Sc	Sr	Ti	Tl	U	V	W	Zn	LOI
	ppb	ppb	ppb	ppm	%	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	%	ppm	ppb	%	ppm	%	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	%
98HJB 0068	<2	<5	<2	<.2	0.78	<2	90	<.5	<2	0.35	<.5	4	15	10	1.32	<10	<10	0.14	30	0.28	145	<1	0.01	8	640	10	<2	2	71	0.05	<10	<10	17	<10	20	0.6
98HJB 0069	<2	<5	2	<.2	0.68	2	90	<.5	<2	0.3	<.5	4	16	8	1.19	<10	<10	0.12	30	0.24	135	1	0.01	7	610	8	<2	1	70	0.04	<10	<10	15	<10	16	0.8
98HJB 0070	<2	<5	<2	<.2	0.99	4	180	<.5	<2	0.31	<.5	4	18	10	1.52	<10	<10	0.18	30	0.33	145	1	0.01	9	650	10	<2	2	69	0.05	<10	<10	20	<10	24	0.6
98HJB 0071	<2	<5	2	<.2	0.65	2	80	<.5	<2	0.3	<.5	4	18	8	1.23	<10	<10	0.11	30	0.28	120	<1	0.01	9	650	8	<2	1	87	0.05	<10	<10	18	<10	16	1
98HJB 0072	<2	<5	<2	<.2	0.67	6	80	<.5	<2	0.32	<.5	4	23	10	1.43	<10	<10	0.1	40	0.31	130	<1	0.01	10	650	8	<2	2	127	0.05	<10	<10	20	<10	16	1
98HJB 0073	24	<5	<2	<.2	0.9	2	140	<.5	<2	0.3	<.5	3	23	10	1.48	<10	<10	0.15	40	0.32	115	1	<.01	10	700	8	<2	2	120	0.04	<10	<10	21	<10	18	1
98HJB 0074	10	<5	<2	<.2	0.41	6	70	<.5	<2	0.28	<.5	3	20	10	1.16	<10	<10	0.06	30	0.21	110	<1	<.01	8	800	8	<2	1	82	0.04	<10	<10	17	<10	12	0.8
98HJB 0075	<2	<5	<2	<.2	0.75	8	160	<.5	<2	0.27	<.5	4	15	7	1.13	<10	<10	0.14	30	0.32	140	1	0.01	8	610	8	<2	1	55	0.03	<10	<10	14	<10	18	0.6

Additional Samples (55M)

Sample No.	Au	Pt	Pd	Ag	Al	As	Ba	Be	Bi	Ca	Cd	Co	Cr	Cu	Fe	Ga	Hg	K	La	Mg	Mn	Mo	Na	Ni	P	Pb	Sb	Sc	Sr	Ti	Tl	U	V	W	Zn	LOI
	ppb	ppb	ppb	ppm	%	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	%	ppm	ppb	%	ppm	%	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	%
98HJB 0001	<2	<5	2	<.2	0.54	<2	150	<.5	<2	0.19	<.5	3	17	5	1.05	<10	<10	0.09	20	0.21	105	<1	<.01	8	650	10	<2	1	94	0.01	<10	<10	14	<10	12	1.2
98HJB 0002	<2	<5	2	<.2	0.32	8	130	<.5	<2	0.23	<.5	2	17	3	1.04	<10	<10	0.05	30	0.15	100	<1	<.01	7	800	6	<2	1	93	0.02	<10	<10	13	<10	10	0.2
98HJB 0003	48	<5	4	<.2	1.06	2	110	<.5	<2	0.48	<.5	9	29	25	1.85	<10	<10	0.17	30	0.61	240	<1	0.01	19	1000	6	<2	3	41	0.07	<10	<10	29	<10	32	1
98HJB 0004	4	<5	2	<.2	0.85	2	70	<.5	<2	0.34	<.5	8	23	20	1.56	<10	<10	0.09	20	0.46	180	1	0.01	14	840	4	<2	1	28	0.06	<10	<10	24	<10	26	1.8
98HJB 0005	4	<5	2	<.2	0.85	<2	100	<.5	<2	0.4	<.5	8	25	17	1.63	<10	<10	0.15	30	0.54	220	1	0.01	18	860	6	<2	1	32	0.06	<10	<10	24	<10	26	0.6
98HJB 0006	<2	<5	<2	<.2	0.6	6	150	<.5	<2	0.21	<.5	3	19	4	1.17	<10	<10	0.1	30	0.22	115	<1	<.01	9	700	8	<2	1	117	0.01	<10	<10	15	<10	12	0.8
98HJB 0007	<2	<5	2	<.2	0.82	4	140	<.5	<2	0.3	<.5	5	16	17	1.41	<10	<10	0.15	30	0.36	155	1	0.01	10	660	10	<2	3	63	0.04	<10	<10	16	<10	26	1
98HJB 0008	<2	<5	<2	<.2	0.43	2	60	<.5	<2	0.29	<.5	3	12	4	1.02	<10	<10	0.05	30	0.22	90	<1	<.01	6	710	4	<2	1	64	0.04	<10	<10	13	<10	16	0.6
98HJB 0009	<2	<5	<2	<.2	0.63	6	100	<.5	<2	0.3	<.5	4	15	8	1.27	<10	<10	0.12	30	0.3	160	1	0.01	8	680	6	<2	2	61	0.05	<10	<10	17	<10	20	0.8

Appendix 6:

Geochemisty of Soil Profile Samples
(<0.002 and <0.063mm size fraction)

Appendix 6
Geochemisty of soil profile samples
(<0.002 and <0.063 mm fractions)

<0.002 mm fraction

Sample No.	Ag ppm	Al %	As ppm	B ppm	Ba ppm	Be ppm	Bi ppm	Ca %	Cd ppm	Co ppm	Cr ppm	Cu ppm	Fe %	Ga ppm	Hg ppb	K %	La ppm	Mg %	Mn ppm	Mo ppm	Na %	Ni ppm	P ppm	Pb ppm	S (%)	Sb ppm	Sc ppm	Sr ppm	Ti %	Tl ppm	U ppm	V ppm	W ppm	Zn ppm	LOI %
Pit 2																																			
99HJB0085	<0.2	2.47	14	10	200	1	<2	0.31	<0.5	14	60	41	3.49	10	10	0.45	100	0.94	280	2	0.58	28	5370	26	0.01	<2	6	245	0.07	<10	<10	57	<10	60	5.6
99HJB0089	<0.2	2.3	10	<10	180	1	<2	0.31	<0.5	11	55	25	3.34	<10	10	0.41	80	0.82	260	2	0.34	25	2610	20	0.01	2	6	253	0.08	<10	<10	54	<10	56	5
99HJB0090	<0.2	2.42	8	10	190	1	<2	0.25	<0.5	9	52	26	3.07	<10	10	0.46	70	0.93	240	1	0.33	26	2010	20	<0.01	<2	8	212	0.09	<10	<10	49	<10	58	5.2
99HJB0091	<0.2	2.36	8	10	210	1	<2	0.26	<0.5	10	52	24	3.06	<10	<10	0.44	70	0.93	265	1	0.31	26	2160	18	<0.01	<2	6	224	0.09	<10	<10	47	<10	58	4.8
99HJB0092	<0.2	2.26	8	10	200	1	<2	0.26	<0.5	10	50	23	3.02	<10	<10	0.42	70	0.9	250	3	0.31	24	2010	18	<0.01	<2	6	224	0.09	<10	<10	46	<10	56	4.2
99HJB0093	<0.2	2.12	8	10	180	1	<2	0.24	<0.5	10	51	25	2.98	<10	<10	0.4	60	0.92	245	1	0.32	26	1830	16	<0.01	<2	5	176	0.05	<10	<10	44	<10	60	4.4
Pit 3																																			
99HJB0096	<0.2	2.18	8	10	230	0.5	<2	0.26	<0.5	11	42	24	3.55	<10	<10	0.4	60	0.79	395	1	0.54	22	4890	24	<0.01	<2	5	199	0.05	<10	<10	43	<10	54	4.2
99HJB0099	<0.2	2.06	6	10	210	0.5	<2	0.26	<0.5	9	41	21	3.11	<10	<10	0.38	70	0.79	305	<1	0.31	21	2080	20	<0.01	<2	5	194	0.05	<10	<10	39	<10	54	4
99HJB0100	<0.2	2.18	8	10	260	0.5	<2	0.25	<0.5	9	42	23	2.92	<10	10	0.39	70	0.86	290	1	0.27	22	1600	18	<0.01	<2	5	169	0.04	<10	<10	38	<10	58	4.2
99HJB0101	<0.2	2.44	10	10	260	0.5	<2	0.26	<0.5	10	44	25	3.08	<10	10	0.45	70	0.93	285	1	0.29	22	1590	18	<0.01	<2	5	191	0.04	<10	<10	40	<10	60	7.2
99HJB0102	<0.2	2.46	14	10	300	0.5	<2	0.24	<0.5	9	44	24	3.02	<10	<10	0.47	70	0.91	270	<1	0.28	23	1520	18	<0.01	<2	5	192	0.04	<10	<10	39	<10	58	4.2
99HJB0103	<0.2	2.49	10	10	330	0.5	<2	0.25	<0.5	9	44	23	2.99	<10	10	0.48	70	0.89	275	<1	0.27	22	1560	18	<0.01	<2	5	192	0.04	<10	<10	38	<10	58	4.4
99HJB0104	<0.2	2.72	8	10	290	1	<2	0.27	<0.5	10	47	26	3.19	<10	10	0.53	70	0.94	290	<1	0.33	23	2150	20	<0.01	<2	5	221	0.04	<10	<10	41	<10	60	4.2

<0.063 mm fraction

Sample No.	Ag ppm	Al %	As ppm	B ppm	Ba ppm	Be ppm	Bi ppm	Ca %	Cd ppm	Co ppm	Cr ppm	Cu ppm	Fe %	Ga ppm	Hg ppb	K %	La ppm	Mg %	Mn ppm	Mo ppm	Na %	Ni ppm	P ppm	Pb ppm	S (%)	Sb ppm	Sc ppm	Sr ppm	Ti %	Tl ppm	U ppm	V ppm	W ppm	Zn ppm	LOI %
Pit 1																																			
99HJB0080	<0.2	0.3	2	<10	40	<0.5	<2	0.19	<0.5	2	12	5	0.64	<10	<10	0.04	10	0.15	85	<1	<0.01	5	660	8	<0.01	<2	<1	37	0.02	<10	<10	13	<10	10	0.8
99HJB0081	<0.2	0.33	6	<10	40	<0.5	<2	0.19	<0.5	3	13	5	0.91	<10	<10	0.05	20	0.17	95	<1	<0.01	5	650	6	<0.01	<2	<1	41	0.03	<10	<10	14	<10	12	0.8
99HJB0082	<0.2	0.42	2	10	60	<0.5	<2	0.19	<0.5	3	14	4	1.01	<10	<10	0.05	20	0.19	125	<1	<0.01	5	680	6	<0.01	<2	1	45	0.03	<10	<10	15	<10	14	1.6
99HJB0083	<0.2	0.51	4	<10	70	<0.5	<2	0.2	<0.5	4	15	5	1.14	<10	<10	0.06	30	0.2	155	<1	<0.01	6	700	6	<0.01	<2	1	53	0.04	<10	<10	17	<10	16	2.8
99HJB0084	<0.2	0.53	2	10	60	<0.5	<2	0.21	<0.5	5	16	5	1.19	<10	<10	0.06	30	0.2	165	<1	<0.01	6	710	6	0.01	<2	1	56	0.04	<10	<10	18	<10	16	4
99HJB0085	<0.2	0.42	4	<10	70	<0.5	<2	0.17	<0.5	3	14	6	1.01	<10	<10	0.05	20	0.16	115	<1	<0.01	5	560	4	0.01	<2	1	38	0.04	<10	<10	15	<10	14	3.6
99HJB0086	<0.2	0.52	4	<10	120	<0.5	<2	0.14	<0.5	3	18	9	1.1	<10	<10	0.06	20	0.14	85	<1	<0.01	6	530	6	0.03	<2	1	35	0.03	<10	<10	15	<10	14	10.4
99HJB0087	<0.2	0.43	4	<10	70	<0.5	<2	0.24	<0.5	4	18	7	1.18	<10	<10	0.07	30	0.21	130	<1	<0.01	7	600	6	<0.01	<2	1	51	0.04	<10	<10	18	<10	16	1
Pit 2																																			
99HJB0088	<0.2	0.32	2	<10	60	<0.5	<2	0.24	<0.5	3	14	5	0.91	<10	<10	0.05	20	0.17	85	<1	<0.01	6	720	4	<0.01	<2	1	59	0.03	<10	<10	14	<10	10	0.4
99HJB0089	<0.2	0.36	2	<10	60	<0.5	<2	0.24	<0.5	1	10	4	0.6	<10	<10	0.05	30	0.17	55	<1	<0.01	4	780	2	<0.01	<2	1	70	0.01	<10	<10	10	<10	10	0.6
99HJB0090	<0.2	0.49	4	<10	80	<0.5	<2	0.26	<0.5	3	15	5	1.08	<10	<10	0.08	30	0.21	80	<1	<0.01	8	770	6	<0.01	<2	1	82	0.04	<10	<10	18	<10	14	0.8
99HJB0091	<0.2	0.62	6	<10	100	<0.5	<2	0.27	<0.5	3	17	6	1.21	<10	<10	0.11	30	0.25	90	<1	<0.01	7	760	6	<0.01	<2	1	92	0.04	<10	<10	18	<10	16	1.6
99HJB0092	<0.2	0.71	6	<10	110	<0.5	<2	0.28	<0.5	3	19	7	1.34	<10	<10	0.12	30	0.3	110	<1	<0.01	8	770	8	<0.01	<2	1	97	0.04	<10	<10	19	<10	18	1.6
99HJB0093	<0.2	0.76	4	10	120	<0.5	<2	0.28	<0.5	4	20	8	1.31	<10	<10	0.13	30	0.3	105	<1	0.01	8	760	8	<0.01	<2	1	98	0.04	<10	<10	19	<10	18	1.4
Pit 3																																			
99HJB0098	<0.2	0.41	2	10	110	<0.5	<2	0.26	<0.5	3	11	4	1.03	<10	<10	0.06	30	0.15	145	<1	<0.01	5	750	8	<0.01	<2	1	84	0.03	<10	<10	14	<10	10	1
99HJB0099	<0.2	0.63	6	10	220	<0.5	<2	0.28	<0.5	4	16	7	1.36	<10	<10	0.14	40	0.28	160	<1	0.01	8	880	6	<0.01	<2	1	104	0.04	<10	<10	17	<10	18	1.2
99HJB0100	<0.2	1.51	8	10	360	0.5	<2	0.27	<0.5	5	24	16	1.77	<10	<10	0.29	40	0.47	160	<1	0.01	12	620	10	<0.01	<2	3	107	0.03	<10	<10	22	<10	30	2.4
99HJB0101	<0.2	1.03	4	10	280	<0.5	<2	0.27	<0.5	4	19	10	1.45	<10	<10	0.18	40	0.34	150	<1	0.01	10	660	8	<0.01	<2	2	99	0.03	<10	<10	18	<10	22	1.8
99HJB0102	<0.2	1.27	8	10	320	<0.5	<2	0.28	<0.5	4	21	13	1.65	<10	<10	0.23	40	0.41	160	<1	0.01	11	650	12	<0.01	<2	3	111	0.03	<10	<10	21	<10	26	2
99HJB0103	<0.2	0.87	4	10	260	<0.5	<2	0.23	<0.5	4	18	12	1.46	<10	<10	0.16	30	0.35	145	<1	0.01	10	610	8	<0.01	<2	2	84	0.01	<10	<10	17	<10	24	1.8
99HJB0104	<0.2	0.74	2	10	240	<0.5	<2	0.24	<0.5	4	16	9	1.29	<10	<10	0.12	30	0.28	165	<1	<0.01	7	690	10	<0.01	<2	1	81	0.03	<10	<10	16	<10	20	0.8

Appendix 7: Grain Size Analyses

a) Sediment samples

b) Soil profiles

Appendix 7: Grain size Analyses

a) Regional sediment samples - complete grain size analyses

	Weight (g)				Size Fraction (mm) (Reported as a percentage <2mm)										Size Fraction (mm) (Reported as percentage of <2mm)								Grain Size Summary			
Sample No	Dry split	> 2mm	2-0.063mm	< 0.063mm	2-1.4	1.4-1	1-.71	.71-.50	.50-.35	.35-.25	.25-.18	.18-.12	.12-.088	.088-.063	.063-.044	.044-.031	.031-.015	.016-.008	.008-.004	.004-.002	.002-.001	< .001	% Pebbles	% Sand	% Silt	% Clay
98HJB0010	636.59	81.71	351.54	203.34	3.03	3.97	5.87	7.32	7.93	7.97	6.57	7.76	7.52	5.40	3.66	4.17	7.68	8.42	8.41	3.30	0.79	0.21	12.84	63.35	35.65	0.99
98HJB0011	275.18	10.37	153.42	111.39	2.02	2.87	4.28	5.37	7.06	7.31	6.67	7.75	7.42	7.18	5.28	6.64	8.12	8.60	9.28	3.25	0.71	0.17	3.77	57.94	41.18	0.88
98HJB0012	356.61	48.54	176.45	131.62	3.51	4.04	5.60	6.60	7.16	6.13	6.54	6.64	5.98	5.08	4.07	4.51	6.67	6.86	7.55	7.63	4.70	0.73	13.61	57.28	37.29	5.43
98HJB0013	497.02	38.09	212.47	246.47	2.39	3.60	3.80	5.43	5.24	5.28	6.21	6.66	6.00	1.69	5.42	5.82	9.59	9.42	9.34	8.39	4.95	0.77	7.66	46.30	47.98	5.72
98HJB0014	508.64	94.93	229.17	184.54	3.42	4.98	5.79	7.16	7.58	6.35	7.08	7.06	5.44	0.55	4.81	5.48	7.75	7.68	7.46	6.93	3.95	0.55	18.66	55.39	40.11	4.50
98HJB0015	436.89	110.49	196.17	130.23	2.83	3.59	5.38	6.72	7.67	7.07	7.18	7.36	6.62	5.69	4.67	5.77	7.68	7.23	6.75	5.48	2.18	0.13	25.29	60.10	37.59	2.31
98HJB0016	400.16	149.34	179.92	70.90	5.17	5.53	7.43	8.64	9.37	8.20	8.53	7.46	6.22	5.19	4.39	2.97	5.31	5.03	4.92	4.08	1.57	0.00	37.32	71.73	26.70	1.57
98HJB0017	573.12	90.14	279.69	203.29	3.02	3.49	5.05	6.08	7.22	6.59	7.60	6.91	6.34	5.61	5.60	5.02	8.69	8.85	7.61	4.72	1.60	0.00	15.73	57.91	40.49	1.60
98HJB0018	241.66	19.36	78.10	144.20	1.10	1.74	2.54	3.30	3.86	3.26	3.29	4.27	5.58	6.18	24.26	13.10	19.14	6.60	1.78	0.00	0.00	0.00	8.01	35.13	64.87	0.00
98HJB0019	509.69	101.36	277.35	130.99	3.84	4.14	6.35	7.75	8.77	6.55	8.13	8.31	13.85	0.24	4.18	3.58	5.89	5.42	5.09	4.54	2.88	0.48	19.89	67.92	28.72	3.36
98HJB0020	407.12	136.60	207.90	62.62	3.95	4.61	7.12	8.74	10.04	9.01	9.64	9.32	8.18	6.05	5.58	2.90	4.13	3.10	2.77	2.52	1.68	0.47	33.55	76.85	21.00	2.15
98HJB0021	524.34	92.05	242.46	189.83	2.59	3.12	4.50	6.25	7.24	6.44	7.58	6.99	6.23	5.16	6.01	4.96	7.14	6.85	6.98	6.77	4.32	0.89	17.56	56.09	38.71	5.21
98HJB0022	360.63	50.94	182.54	127.15	3.08	3.66	5.28	7.18	8.24	6.84	7.31	6.93	5.63	4.79	4.85	4.20	8.09	7.94	7.71	5.76	2.34	0.16	14.13	58.94	38.55	2.50
98HJB0023	483.19	47.92	282.93	152.34	3.35	4.19	5.72	7.32	7.44	6.47	6.69	7.04	11.41	5.38	3.82	3.13	5.52	6.47	7.19	5.99	2.67	0.20	9.92	65.00	32.13	2.87
98HJB0024	518.05	133.92	280.94	103.19	4.81	6.31	6.93	8.60	8.31	7.63	10.31	9.50	7.73	3.00	8.17	3.78	6.83	3.61	2.70	1.49	0.29	0.00	25.85	73.14	26.57	0.29
98HJB0025	591.98	70.78	312.64	208.37	4.20	5.66	5.49	7.26	5.37	7.06	11.03	8.14	5.36	0.45	5.16	4.19	5.43	5.40	6.10	6.52	4.99	2.18	11.96	60.02	32.80	7.17
98HJB0026	148.15	21.79	79.66	46.70	2.77	3.56	5.29	7.46	8.46	7.70	7.84	7.82	6.67	5.46	5.43	4.19	6.58	6.21	6.61	5.49	2.29	0.16	14.71	63.05	34.50	2.45
98HJB0027	359.55	44.50	192.77	122.28	2.78	3.42	5.05	6.83	7.75	7.03	7.91	7.80	6.91	5.71	5.75	4.35	7.44	6.82	6.48	5.32	2.47	0.19	12.38	61.19	36.15	2.66
98HJB0028	476.47	135.93	244.33	96.22	4.76	5.62	7.72	8.80	9.71	8.04	8.65	7.26	6.07	5.11	4.11	3.73	4.67	4.11	4.34	4.20	2.51	0.58	28.53	71.75	25.17	3.09
98HJB0029	472.03	44.00	210.95	217.08	2.66	4.25	4.61	6.32	5.82	5.64	6.36	6.66	6.01	0.97	5.99	5.09	8.07	7.85	8.61	8.54	5.47	1.09	9.32	49.28	44.16	6.56
98HJB0030	628.55	97.73	339.03	191.80	2.68	3.70	5.64	6.74	8.16	7.52	8.80	7.87	7.06	5.62	8.92	5.79	6.01	3.61	2.64	3.01	3.47	2.68	15.55	63.87	29.98	6.15
98HJB0031	342.72	28.02	206.90	107.80	3.23	4.31	6.46	8.25	9.31	8.09	8.44	7.21	5.92	4.52	5.88	4.23	5.77	5.21	5.28	4.92	2.60	0.37	8.18	65.75	31.28	2.98
98HJB0032	506.14	79.77	280.76	145.61	3.05	3.84	5.51	6.80	8.22	7.43	8.85	8.18	7.53	6.44	4.76	3.48	4.22	3.98	5.31	6.79	4.67	0.93	15.76	65.85	28.55	5.61
98HJB0033	336.02	43.80	163.02	129.20	2.62	3.40	4.81	6.48	7.26	6.28	6.62	6.76	6.22	5.33	5.06	4.13	6.55	6.41	7.23	7.67	5.57	1.59	13.03	55.79	37.05	7.17
98HJB0034	526.04	51.98	286.67	187.39	3.04	3.80	5.34	7.29	7.66	6.33	6.20	6.60	6.83	7.40	8.29	4.55	8.42	6.48	5.52	4.19	1.92	0.16	9.88	60.47	37.45	2.08
98HJB0035	441.82	50.34	221.54	169.95	3.18	3.78	5.49	6.73	7.39	6.51	6.87	6.28	5.60	4.75	5.86	4.25	7.21	6.58	7.30	7.14	4.37	0.71	11.39	56.59	38.33	5.08
98HJB0036	420.81	93.04	230.99	96.78	4.38	5.14	7.02	7.80	8.53	7.69	7.69	8.59	12.78	0.85	3.78	2.86	5.36	4.87	5.50	4.66	2.18	0.32	22.11	70.47	27.02	2.50
98HJB0037	297.15	26.34	148.15	122.66	2.41	3.24	5.06	6.28	7.26	6.22	6.93	6.22	5.68	5.41	4.85	3.92	6.94	6.69	8.18	8.25	5.24	1.22	8.87	54.71	38.83	6.46
98HJB0038	541.17	72.50	240.30	228.37	4.06	5.33	4.91	6.20	5.53	5.33	6.32	7.02	5.66	0.92	4.72	3.98	7.48	7.43	8.96	9.28	5.70	1.19	13.40	51.27	41.84	6.89
98HJB0039	480.66	49.18	232.06	199.42	3.21	4.64	5.59	6.72	6.74	5.88	6.88	7.13	6.00	0.80	7.45	5.45	9.81	8.24	7.57	5.16	2.32	0.23	10.23	53.78	43.67	2.55
98HJB0040	417.86	53.91	206.07	157.88	2.69	4.72	5.30	7.82	7.18	6.61	7.15	7.25	6.27	1.63	5.73	4.54	7.71	6.33	7.02	7.20	4.19	0.66	12.90	56.62	38.57	4.85
98HJB0041	497.02	49.21	263.23	184.58	2.89	5.25	5.90	8.37	7.52	6.85	7.22	7.47	6.27	1.04	5.90	4.77	8.44	6.74	6.60	5.50	2.84	0.43	9.90	58.78	37.95	3.27
98HJB0042	587.62	68.94	269.09	249.59	3.01	3.34	5.02	6.18	6.96	5.91	6.89	6.51	4.56	3.50	5.68	4.65	8.11	7.05	8.10	8.43	5.09	1.01	11.73	51.88	42.02	6.10
98HJB0043	397.45	63.41	189.72	144.32	3.57	5.99	6.40	8.35	7.13	6.37	6.27	6.46	5.61	0.63	5.99	4.69	7.81	6.42	6.95	6.70	3.93	0.70	15.95	56.80	38.57	4.64
98HJB0044	350.12	9.26	112.03	228.83	1.70	1.90	2.69	3.10	3.21	3.04	3.61	4.49	4.75	4.37	8.00	6.23	11.12	10.45	11.66	11.64	6.91	1.13	2.64	32.87	59.10	8.04
98HJB0045	398.08	65.51	189.55	141.03	2.60	3.21	5.08	6.73	7.75	6.98	7.07	6.70	5.85	5.36	7.97	5.95	9.07	5.85	5.72	5.07	2.77	0.26	16.54	57.34	39.63	3.03
98HJB0046	365.42	31.01	143.90	190.52	2.61	2.76	3.98	4.84	5.11	4.50	5.10	4.97	4.82	4.35	5.38	4.98	9.75	8.98	10.08	9.97	6.35	1.48	8.49	43.03	49.15	7.82
98HJB0047	462.94	76.09	212.32	174.53	3.21	1.93	11.21	7.43	6.61	6.25	5.77	4.71	4.24	3.52	4.43	4.04	7.20	6.48	7.92	8.21	5.45	1.37	16.44	54.88	38.29	6.83
98HJB0048	311.86	36.08	152.73	123.05	2.73	3.84	5.56	6.71	7.23	6.24	6.50	6.34	5.56	4.67	5.41	4.37	7.48	6.64	7.47	7.26	4.78	1.20	11.57	55.38	38.63	5.98
98HJB0049	594.10	89.46	324.59	180.05	2.95	3.75	5.69	8.24	9.58	8.12	8.60	6.89	5.68	4.82	6.24	4.67	8.00	5.57	4.66	3.53	2.31	0.70	15.06	64.32	32.67	3.01
98HJB0050	526.81	109.20	217.77	199.84	2.40	3.29	4.82	6.13	6.62	6.02	6.00	6.30	5.74	4.82	4.79	3.89	6.81	7.01	9.12	9.27	5.71	1.25	20.73	52.15	40.90	6.95
98HJB0051	431.35	68.44	216.61	146.30	2.89	3.69	5.31	7.26	8.19	7.16	7.57	6.84	5.93	5.05	5.26	4.07	7.07	6.19	6.95	6.42	3.73	0.62	15.87	59.69	35.96	4.35
98HJB0052	436.16	69.64	261.87	104.65	4.10	4.84	6.59	8.81	9.86	7.88	9.63	8.97	6.23	4.54	3.30	2.69	4.94	4.21	4.65	4.67	3.15	0.94	15.97	71.45	24.47	4.08
98HJB0054	385.32	54.92	322.09	8.32	0.38	0.78	1.15	7.22	46.96	27.48	9.92	2.74	0.81	0.05	0.28	0.15	0.37	0.45	0.47	0.41	0.26	0.12	14.25	97.48	2.13	0.39
98HJB0056	530.72	59.74	294.98	176.02	3.26	4.89	6.03	7.83	8.88	7.34	8.90	8.26	6.13	1.12	7.27	4.85	8.49	5.57	4.41	3.70	2.55	0.52	11.26	62.63	34.30	3.07
98HJB0057	474.31	51.97	248.70	173.64	2.61	3.21	4.92	7.31	8.43	7.68	7.40	6.91	5.61	4.81	5.01	3.97	7.24	6.42	7.18	6.76	3.92	0.62	10.96	58.89	36.57	4.54
98HJB0059	415.10	105.20	144.86	165.04	1.86	2.50	3.64	5.17	6.16	5.52	6.84	5.83	5.11	4.10	5.47	5.17	11.48	11.61	10.40	8.36	2.55	0.22	25.34	46.74	50.49	2.77
98HJB0060	310.47	74.30	188.01	48.16	4.35	5.51	7.94	9.69	10.51	9.04	9.23	8.94	7.85	6.55	2.45	2.08	4.29	3.91	3.59	2.64	1.32	0.12	23.93	79.61	18.95	1.44
98HJB0061	357.53	12.27	151.72	193.55	0.90	1.49	2.96	5.21	9.97	10.43	4.80	2.71	2.80	2.66	6.33	7.27	13.70	9.73	8.97	6.65	3.12	0.30	3.43	43.94	52.64	3.41
98HJB0062	368.24	57.12	177.39	133.73	2.59	3.52	5.10	6.55	7.26	6.62	7.19	6.75	6.09	5.37	5.97	4.58	7.94	6.39	6.66	6.37	4.09	0.97	15.51	57.02	37.92	5.07
98HJB0063	445.00	97.98	216.08	130.94	3.06	4.10	6.27	7.91	8.89	7.61	7.52	6.78	5.56	4.55	4.58	3.66	6.17	5.28	6.18	6.51	4.35	1.00	22.02	62.27	32.38	5.35
98HJB0064	437.69	59.42	229.65	148.63	3.11	5.31	5.95	8.53	7.97	7.35	7.18	6.99	6.82	1.50	6.69	4.87	8.27	6.01	5.72	4.70	2.57	0.45	13.57	60.71	36.27	3.02

Appendix 7: Grain size Analyses

	Weight (g)				Size Fraction (mm) (Reported as a percentage <2mm)									Size Fraction (mm) (Reported as percentage of <2mm)								Grain Size Summary			
Sample No	Dry split	> 2mm	2-0.063mm	< 0.063mm	2-1.4	1.4-1	1-.71	.71-.50	.50-.35	.35-.25	.25-.18	.18-.12	.12-.088	.088-.063	.063-.044	.044-.031	.031-.018	.018-.008	.008-.004	.004-.002	.002-.001	<.001	% Pebbles	% Sand	% Silt	% Clay
98HJB0065	552.32	65.90	273.45	212.97	2.53	3.25	5.13	6.79	8.33	6.69	6.54	9.71	2.37	4.87	6.06	4.89	8.89	6.89	6.83	6.16	3.52	0.56	11.93	56.22	39.71	4.07
98HJB0066	341.30	29.71	143.81	167.78	2.39	3.32	4.51	5.42	6.04	5.17	5.71	4.98	4.51	4.11	6.83	5.25	9.49	8.39	9.18	8.67	5.14	0.90	8.70	46.15	47.81	6.04
98HJB0067	450.96	40.62	224.25	186.10	2.22	2.92	4.40	6.34	7.56	6.86	7.28	6.43	5.65	4.97	5.60	4.51	8.15	6.92	7.55	7.39	4.49	0.73	9.01	54.65	40.13	5.22
98HJB0068	337.72	1.69	104.44	231.59	1.20	2.07	3.12	3.84	3.76	4.39	4.34	4.10	3.54	0.71	10.50	7.77	14.38	11.20	10.75	8.84	4.74	0.75	0.50	31.08	63.43	5.49
98HJB0069	538.55	77.88	303.09	157.58	2.76	3.35	5.35	6.70	8.02	6.78	8.04	8.56	8.61	7.63	6.83	4.34	7.05	4.75	4.57	3.99	2.28	0.40	14.46	65.79	31.53	2.68
98HJB0070	406.42	32.12	237.81	136.49	3.07	4.33	5.95	7.68	8.33	7.24	7.66	6.87	6.82	5.59	5.95	4.30	6.96	4.53	4.69	5.35	3.79	0.88	7.90	63.53	31.80	4.67
98HJB0071	470.77	86.15	226.21	158.41	2.63	3.38	5.01	6.92	8.31	7.29	7.86	6.93	5.71	4.77	5.16	4.07	7.45	6.27	6.44	6.45	4.42	0.92	18.30	58.61	35.84	5.34
98HJB0072	373.38	76.27	164.07	133.04	3.23	3.72	5.62	7.00	8.13	6.48	6.11	5.59	5.21	4.13	3.86	4.00	8.66	8.61	9.45	7.20	2.80	0.20	20.43	55.22	41.78	3.00
98HJB0073	335.95	62.81	143.37	129.77	2.70	3.27	5.03	6.57	7.46	6.71	6.34	5.61	8.78	0.01	4.64	4.52	9.37	8.78	8.85	7.14	3.68	0.55	18.70	52.49	43.29	4.22
98HJB0074	475.01	56.68	195.96	222.37	2.58	3.05	4.50	5.67	6.55	5.92	5.82	5.26	4.16	3.36	7.67	6.13	11.39	9.28	8.67	6.62	3.12	0.28	11.93	46.84	49.76	3.40
98HJB0075	323.63	38.64	158.12	126.88	2.35	2.30	4.96	5.07	6.65	6.10	6.03	7.81	6.46	7.76	4.52	4.89	10.52	9.86	9.87	3.69	0.92	0.26	11.94	55.48	43.34	1.18

Additional samples (55M)

	Weight (g)				Size Fraction (mm) (Reported as a percentage <2mm)									Size Fraction (mm) (Reported as percentage of <2mm)								Grain Size Summary			
Sample No	Dry split	> 2mm	2-0.063mm	< 0.063mm	2-1.4	1.4-1	1-.71	.71-.50	.50-.35	.35-.25	.25-.18	.18-.12	.12-.088	.088-.063	.063-.044	.044-.031	.031-.018	.018-.008	.008-.004	.004-.002	.002-.001	<.001	% Pebbles	% Sand	% Silt	% Clay
98HJB0001	716.89	100.35	372.37	244.17	2.65	3.57	5.67	7.19	10.28	9.22	6.64	6.37	4.89	3.91	2.40	4.36	5.78	7.41	12.03	5.49	1.70	0.44	14.00	60.40	37.47	2.13
98HJB0002	624.75	212.70	260.17	151.89	3.07	2.67	6.41	7.03	10.61	9.30	7.35	7.38	4.72	4.60	4.00	4.04	6.00	7.44	9.93	4.18	1.02	0.25	34.05	63.14	35.59	1.27
98HJB0003	578.08	57.06	214.35	306.68	2.28	2.80	3.89	5.03	5.32	4.47	4.61	4.73	4.28	3.74	6.08	6.88	12.20	11.60	10.43	7.90	3.49	0.28	9.87	41.14	55.09	3.77
98HJB0004	347.15	108.88	110.88	127.40	3.96	4.51	5.07	5.25	4.69	5.19	5.43	5.51	5.57	1.36	8.25	6.74	12.70	9.95	8.31	5.51	2.00	0.00	31.36	46.53	51.46	2.00
98HJB0005	494.89	133.75	192.17	168.97	4.50	5.18	5.26	6.26	6.59	5.75	6.26	6.30	5.97	1.14	6.24	5.47	9.77	8.97	8.24	6.07	2.02	0.00	27.03	53.21	44.77	2.02
98HJB0006	709.73	103.90	302.80	303.04	2.12	2.88	3.88	4.49	5.94	5.74	5.19	6.78	6.66	6.28	5.63	6.46	9.35	9.29	12.35	5.20	1.35	0.39	14.64	49.98	48.28	1.74
98HJB0007	599.69	75.88	336.83	186.99	3.10	2.80	6.00	5.79	7.67	6.96	6.85	9.97	7.57	7.61	3.87	4.12	6.33	6.89	8.93	4.01	1.19	0.36	12.65	64.30	34.14	1.55
98HJB0008	605.61	91.41	329.61	184.59	3.07	3.77	5.23	6.88	8.06	10.10	7.82	7.18	6.84	5.16	3.40	2.69	6.01	7.43	10.32	4.55	1.17	0.32	15.09	64.10	34.41	1.50
98HJB0009	608.20	112.15	267.73	228.31	2.75	2.44	5.91	5.82	6.45	5.50	6.27	9.57	5.04	4.22	3.89	4.46	7.91	8.44	13.41	5.68	1.69	0.55	18.44	53.97	43.79	2.24

b) Soil Profiles - sand/silt/clay determination

	Weight (g)				% vol. PSA		% of bulk	wt. % Pebbles-Sand-Silt-Clay		
Sample No.	Dry split	> 2mm	2mm-0.063mm	< 0.063mm	Silt	Clay	> 2mm	2mm-0.063mm	0.063mm-0.002mm	< 0.002mm
Pit 1										
99HJB0080	486.92	38.93	298.95	149.04	97.71	2.29	8.00	66.73	32.51	0.76
99HJB0081	353.70	26.94	225.21	101.55	97.33	2.67	7.62	68.92	30.25	0.83
99HJB0082	413.85	39.98	275.17	98.70	94.85	5.15	9.66	73.60	25.04	1.36
99HJB0083	472.26	78.36	294.25	99.65	94.83	5.17	16.59	74.70	23.99	1.31
99HJB0084	452.08	76.95	277.07	98.06	94.76	5.24	17.02	73.86	24.77	1.37
99HJB0085	500.48	75.83	342.24	82.42	97.06	2.94	15.15	80.59	18.84	0.57
99HJB0086	489.27	79.42	317.79	92.07	95.76	4.24	16.23	77.54	21.51	0.95
99HJB0087	612.90	164.80	355.11	92.99	96.65	3.35	26.89	79.25	20.06	0.70
Pit 2										
99HJB0088	271.31	46.20	113.59	111.52	96.63	3.37	17.03	50.46	47.87	1.67
99HJB0089	253.11	28.68	81.23	143.20	97.09	2.91	11.33	36.20	61.95	1.86
99HJB0090	240.79	17.83	63.94	159.02	95.56	4.44	7.40	28.68	68.16	3.17
99HJB0091	417.51	37.44	90.09	289.98	94.92	5.08	8.97	23.70	72.42	3.88
99HJB0092	344.90	14.94	62.92	267.04	93.75	6.25	4.33	19.07	75.87	5.06
99HJB0093	447.76	46.40	55.98	345.38	94.28	5.72	10.36	13.95	81.13	4.92
Pit 3										
99HJB0098	260.49	22.97	139.72	97.80	95.53	4.47	8.82	58.83	39.33	1.84
99HJB0099	232.41	22.42	119.16	90.83	93.84	6.16	9.65	56.75	40.59	2.66
99HJB0100	549.58	59.32	242.63	247.64	92.69	7.31	10.79	49.49	46.82	3.69
99HJB0101	296.40	17.07	130.61	148.71	92.87	7.13	5.76	46.76	49.44	3.80
99HJB0102	355.33	28.24	154.71	172.38	92.21	7.79	7.95	47.30	48.60	4.11
99HJB0103	332.01	47.85	139.29	144.86	92.25	7.75	14.41	49.02	47.03	3.95
99HJB0104	423.02	57.66	184.03	181.33	91.48	8.52	13.63	50.37	45.40	4.23

Appendix 8:
Pebble Lithology

a) Regional Sediment Samples
b) Esker Samples

Sample preparation: wet sieve 4-8 mm range
Analytical Method: visual count (maximum 300 pebbles)

Dubawnt Supergroup	Arkose -	red, fine to medium grained sandstone
	Volcanics -	dark red to purple fine to micro-crystalline lithologies; may contain distinctive white to cream feldspar phenocrysts
	-	dark red fine grained volcaniclastic lithologies
	Quartz ss -	fine to coarse-grained quartz sandstone; white kaolinitic cement; class also includes rounded quartz pebbles
Plutonic Rocks	Felsic -	felsic and intermediate fine to coarse crystalline lithologies; includes granitic, tonalitic, dioritic compositions among others
	Mafic -	dark black coarse crystalline lithologies; gabbro, anorthosite
Greenstone Belt Rocks	Metavolc. -	mafic volcanics, primarily basalt; may include other dark fine crystalline lithologies
	Metaseds. -	highly metamorphosed, compositionally banded, crystalline rocks; includes quartz + feldspar + biotite and metamorphic minerals including garnet, staurolite, sillimanite
	Felsic volc.	Intermediate to felsic volcanic rocks, light grey; includes pyroclastic rocks and tuffs
Other		unusual or unknown rock types

% - weight percent

Appendix 8: Pebble Lithology, 4-8mm fraction, Regional Sediment Samples

a) Regional samples (55M/7 and M/10)

Sample No.	No. of Pebbles	Total Weight (gm)	Dubawnt Supergroup				Plutonic Rocks			Greenstone Belt Rocks				Other (%)
			Arkose (%)	Volcanics (%)	Quartz ss (%)	Total Dubawnt (%)	Felsic (%)	Mafic (%)	Total Plutonic (%)	Metavolc. (%)	Metased. (%)	Felsic Volc? (%)	Total Greenstone (%)	
98HJB 0010	300	78.0	10.4	9.2	12.4	32.0	50.4	1.3	51.7	10.4	5.4	0.0	15.8	0.4
98HJB 0011	300	69.3	19.0	8.8	13.5	41.3	47.8	2.2	50.0	5.6	3.1	0.0	8.7	0.0
98HJB 0012	300	63.6	17.9	12.1	1.5	31.5	39.0	0.0	39.0	6.2	18.2	0.9	25.3	4.2
98HJB 0013	300	65.8	9.2	13.9	1.0	24.1	47.5	0.0	47.5	2.8	24.2	0.3	27.3	1.1
98HJB 0014	300	81.2	11.9	5.7	4.7	22.4	52.4	0.0	52.4	2.0	22.5	0.3	24.7	0.5
98HJB 0015	300	74.5	25.0	8.4	6.1	39.5	44.9	0.0	44.9	1.0	14.2	0.4	15.6	0.0
98HJB 0016	300	78.3	21.4	15.7	10.8	47.9	33.1	0.0	33.1	4.0	13.6	1.5	19.1	0.0
98HJB 0017	300	87.3	13.4	8.9	3.7	26.1	51.9	0.2	52.1	4.6	14.3	1.2	20.1	1.8
98HJB 0018	300	77.7	16.6	8.9	14.3	39.9	33.4	0.0	33.4	5.6	19.7	0.0	25.4	1.3
98HJB 0019	300	78.0	27.2	6.6	12.1	46.0	41.4	0.2	41.6	2.9	8.3	0.0	11.2	1.2
98HJB 0020	300	74.1	17.4	10.7	5.1	33.1	33.1	0.0	33.1	4.7	28.1	0.0	32.8	1.0
98HJB 0021	300	79.8	20.1	12.8	6.0	38.9	41.8	0.0	41.8	2.3	17.1	0.0	19.4	0.0
98HJB 0022	300	73.6	15.1	6.6	7.7	29.4	46.6	0.0	46.6	4.1	18.7	1.0	23.8	0.2
98HJB 0023	300	75.3	12.4	9.9	9.6	31.9	48.3	0.0	48.3	0.7	18.1	1.0	19.8	0.0
98HJB 0024	300	75.7	9.8	14.1	6.5	30.4	45.5	0.0	45.5	4.3	19.6	0.0	23.8	0.3
98HJB 0025	300	61.3	14.1	5.6	1.8	21.5	62.1	0.0	62.1	2.8	12.4	0.0	15.0	1.4
98HJB 0026	300	70.1	15.4	13.2	6.6	35.2	40.7	0.3	40.9	2.7	20.4	0.7	23.8	0.0
98HJB 0027	300	74.9	17.8	13.2	6.0	37.0	48.5	0.0	48.5	2.4	9.7	0.3	12.4	2.1
98HJB 0029	300	46.8	17.5	8.1	3.1	28.7	37.5	0.3	37.7	5.2	28.3	0.0	33.5	0.0
98HJB 0030	300	73.6	19.5	12.2	5.3	37.0	43.2	0.0	43.2	3.3	15.9	0.6	19.8	0.0
98HJB 0031	300	70.4	23.0	12.1	7.1	42.2	40.6	0.0	40.6	2.5	14.6	0.0	17.1	0.1
98HJB 0032	300	68.8	30.3	14.9	3.1	48.3	37.3	0.0	37.3	1.5	12.2	0.0	13.7	0.7
98HJB 0033	308	79.2	18.5	14.3	12.4	45.3	34.1	0.0	34.1	2.4	17.1	0.6	20.0	0.5
98HJB 0034	300	73.2	13.7	8.7	5.2	27.6	49.9	0.0	49.9	3.1	18.6	0.2	21.8	0.7
98HJB 0035	300	81.1	24.3	12.4	7.0	43.8	36.4	0.0	36.4	1.8	16.0	1.5	19.3	0.5
98HJB 0036	300	68.4	15.0	5.6	13.6	34.2	54.8	0.1	54.9	0.2	9.1	0.0	9.2	1.6
98HJB 0037	300	68.9	21.0	11.6	8.6	41.2	36.3	0.0	36.3	4.5	16.0	1.3	21.8	0.7
98HJB 0038	300	73.2	12.8	7.3	5.8	25.9	53.6	0.0	53.6	2.8	17.4	0.0	20.3	0.2
98HJB 0039	300	64.5	15.1	11.2	11.5	37.8	41.5	0.0	41.5	2.4	18.2	0.0	20.7	0.0
98HJB 0040	300	64.3	14.9	9.9	6.5	31.3	43.5	0.0	43.5	3.7	21.2	0.2	25.2	0.0
98HJB 0041	300	71.5	17.7	12.6	3.6	33.9	39.1	0.0	39.1	2.5	23.3	1.3	27.0	0.0
98HJB 0042	300	69.9	17.3	12.4	3.8	33.4	42.5	0.0	42.5	2.6	19.0	0.3	21.9	2.1
98HJB 0043	300	79.8	21.3	11.0	5.7	38.1	40.0	0.0	40.0	2.3	19.5	0.0	21.8	0.1
98HJB 0044	300	72.0	19.1	10.8	5.3	35.2	42.9	0.0	42.9	2.0	19.9	0.0	21.9	0.0
98HJB 0045	327	76.8	11.5	27.3	11.5	50.3	33.4	0.0	33.4	1.7	14.3	0.4	16.4	0.0
98HJB 0046	300	70.4	12.9	12.7	3.0	28.6	56.3	0.0	56.3	3.1	11.7	0.3	15.0	0.0
98HJB 0047	300	78.2	9.6	19.2	10.7	39.4	44.5	0.2	44.6	3.1	12.6	0.0	15.8	0.2
98HJB 0048	300	72.8	28.4	11.5	6.9	46.8	38.4	0.0	38.4	0.4	14.4	0.0	14.8	0.0
98HJB 0049	300	68.6	5.8	18.4	11.8	36.0	43.0	0.0	43.0	3.1	16.5	0.5	20.1	0.9
98HJB 0050	300	73.3	23.5	10.8	10.4	44.7	37.3	0.0	37.3	1.1	16.7	0.0	17.8	0.2
98HJB 0051	300	71.2	11.7	16.8	6.9	35.3	38.9	0.0	38.9	3.3	21.2	1.0	25.6	0.1
98HJB 0052	300	70.0	17.4	12.2	2.5	32.1	40.9	0.0	40.9	2.8	23.7	0.4	27.0	0.0
98HJB 0056	300	74.9	17.7	8.0	15.5	41.2	41.2	0.0	41.2	1.2	16.2	0.3	17.7	0.0
98HJB 0057	300	70.0	10.0	17.3	12.1	39.4	44.5	0.3	44.8	1.1	13.7	0.9	15.8	0.0
98HJB 0059	300	67.8	12.9	14.7	10.2	37.8	46.0	0.4	46.4	2.2	10.9	2.7	15.8	0.0
98HJB 0060	300	67.3	19.2	6.8	10.9	37.0	42.2	0.0	42.2	2.6	16.8	0.1	19.5	1.3
98HJB 0062	300	71.0	19.0	11.8	7.3	38.0	48.3	0.0	48.3	1.4	11.5	0.7	13.6	0.0
98HJB 0063	300	71.2	11.8	24.6	11.3	47.8	33.6	0.0	33.6	1.0	16.9	0.0	18.0	0.7

Appendix 8: Pebble Lithology, 4-8mm fraction, Regional Sediment Samples

Sample No.	No. of Pebbles	Total Weight (gm)	Dubawnt Supergroup				Plutonic Rocks			Greenstone Belt Rocks				Other (%)
			Arkose (%)	Volcanics (%)	Quartz ss (%)	Total Dubawnt (%)	Felsic (%)	Mafic (%)	Total Plutonic (%)	Metavolc. (%)	Metased. (%)	Felsic Volc. (%)	Total Greenstone (%)	
98HJB 0064	300	74.6	10.8	6.4	6.8	24.0	47.1	0.0	47.1	4.6	23.8	0.4	28.9	0.0
98HJB 0065	300	80.0	13.0	21.2	9.0	43.1	36.0	1.0	37.1	1.3	17.8	0.5	19.7	0.2
98HJB 0066	300	83.2	17.8	13.8	1.4	32.9	39.7	0.0	39.7	2.1	25.1	0.2	27.4	0.0
98HJB 0067	300	69.5	15.1	18.5	5.3	38.8	49.3	0.0	49.3	1.3	10.6	0.0	11.8	0.0
98HJB 0068	304	69.9	22.4	6.7	3.2	32.2	46.8	0.0	46.8	0.1	20.1	0.0	20.3	0.6
98HJB 0069	300	71.0	15.4	11.4	8.0	34.8	50.1	0.0	50.1	1.5	13.0	0.2	14.6	0.4
98HJB 0070	300	64.8	22.1	10.2	7.9	40.2	39.4	0.3	39.7	3.3	15.2	0.2	18.8	1.3
98HJB 0071	300	73.2	8.7	16.7	9.7	35.2	46.6	0.1	46.7	4.1	12.7	1.2	18.1	0.0
98HJB 0072	300	75.8	7.2	22.7	13.0	42.9	40.3	0.5	40.8	4.6	10.8	0.7	16.0	0.3
98HJB 0073	300	77.2	10.9	15.8	14.6	41.3	43.5	1.9	45.4	3.4	7.9	1.8	13.1	0.2
98HJB 0074	300	69.7	12.1	12.8	9.2	34.1	50.6	0.8	51.4	4.4	9.1	1.1	14.6	0.0
98HJB 0075	300	77.1	13.2	8.9	5.5	27.6	53.8	1.7	55.5	9.4	6.4	1.0	16.8	0.2
Mean	N/A	N/A	15.4	11.9	7.0	36.5	43.0	0.0	43.0	2.7	16.3	0.3	19.4	0.2
Median	N/A	N/A	15.4	11.9	7.0	36.5	43.0	0.0	43.0	2.7	16.3	0.3	19.4	0.2
Standard Deviation	N/A	N/A	5.3	4.6	3.8	6.8	6.4	0.5	6.5	1.9	5.4	0.6	5.3	0.7
Range	N/A	N/A	24.4	21.8	14.5	28.7	29.1	2.2	29.1	10.2	25.2	2.7	24.9	4.2
Minimum	N/A	N/A	5.8	5.6	1.0	21.5	33.1	0.0	33.1	0.1	3.1	0.0	8.7	0.0
Maximum	N/A	N/A	30.3	27.3	15.5	50.3	62.1	2.2	62.1	10.4	28.3	2.7	33.5	4.2

a) Additional samples (55M)

Sample No.	No. of Pebbles	Total Weight (gm)	Dubawnt Supergroup				Plutonic Rocks			Greenstone Belt Rocks				Other (%)
			Arkose (%)	Volcanics (%)	Quartz ss (%)	Total Dubawnt (%)	Felsic (%)	Mafic (%)	Total Plutonic (%)	Metavolc. (%)	Metased. (%)	Felsic Volc. (%)	Total Greenstone (%)	
98HJB 0001	300	77.8	6.4	32.8	30.2	69.5	23.1	0.3	23.4	5.4	1.3	0.5	7.2	0.0
98HJB 0002	300	76.6	3.6	34.5	30.6	68.7	25.8	2.1	28.0	3.3	0.0	0.0	3.3	0.0
98HJB 0003	300	70.0	6.0	4.1	0.0	10.1	56.0	0.0	56.0	17.9	15.3	0.0	33.2	0.8
98HJB 0004	300	75.5	6.4	4.8	0.2	11.4	52.5	0.0	50.5	16.8	21.1	0.3	38.2	0.0
98HJB 0005	300	71.4	11.4	2.3	0.5	14.2	54.2	0.2	54.4	15.5	15.1	0.0	30.2	0.8
98HJB 0006	300	81.2	6.5	26.7	26.9	60.0	29.0	0.0	29.0	2.3	5.5	3.1	10.9	0.0
98HJB 0007	213	54.3	16.6	5.3	13.7	36.5	45.7	4.3	50.1	5.2	9.1	0.0	14.3	0.0
98HJB 0008	300	72.6	14.1	14.4	9.7	37.9	50.0	1.4	51.4	6.2	4.5	0.0	10.7	0.0
98HJB 0009	265	63.5	13.9	7.5	16.1	37.5	52.5	2.4	55.0	5.3	2.2	0.0	7.5	0.0

Lithological analyses by Consorminex, Inc., Gatineau, Quebec

Appendix 8
Esker Pebble Lithology
4-8 mm fraction

			Dubawnt Supergroup				Plutonic Rocks			Greenstone Belt Rocks				
Sample No	No. of Pebbles	Total Weight (gm)	Arkose %	Volcanics %	Quartz ss %	Total Dubawnt (%)	Felsic (%)	Mafic (%)	Total Plutonic (%)	Metavolc. %	Metased %	Felsic volc. %	Total Greenstone (%)	Other %
98HJB 1023	300	238.3	10.2	10.8	0.6	21.7	69.3	0.1	69.4	1.1	6.9	0.4	8.4	0.6
98HJB 1024	300	82.1	8.9	7.3	5.8	22.0	58.8	0	58.8	9.0	9.1	0	18.1	1.1
98HJB 1025	300	55.0	29.2	13.6	5.0	47.8	37.5	0	37.5	3.6	7.9	3.2	14.7	0
98HJB 1026	300	122.4	27.7	9.9	9.5	47.1	33.1	0	33.1	4.7	12.3	0.1	17.1	2.8
98HJB 1027	300	188.5	28.4	13.7	5.3	47.4	39.4	0	39.4	1.9	9.1	1.1	12.1	1.0
98HJB 1028	300	59.8	27.5	12.6	3.0	43.1	40.8	0	40.8	2.4	13.7	0.0	16.1	0
98HJB 1029	300	73.4	27.4	15.8	7.7	50.8	27.6	1.2	28.8	5.1	3.1	10.3	18.6	1.8
98HJB 1030	300	66.7	13.0	7.2	4.2	24.4	59.3	0	59.3	3.6	10.9	1.9	16.4	0
98HJB 1031	300	82.4	12.6	16.3	1.3	30.1	53.8	0	53.8	3.3	11.5	1.3	16.1	0
98HJB 1032	300	193.6	18.5	21.3	1.4	41.2	41.8	0	41.8	8.4	8.7	0.0	17.0	0
99HJB 0094	285	107.5	36.6	3.3	1.8	41.7	50.0	2.8	52.8	0	5.6	0	5.6	0
99HJB 0095	474	101.5	17.9	8.3	2.8	29.0	54.2	6.5	60.7	3.9	6.4	0	10.3	0
99HJB 0096	321	103.2	34.7	9.8	2.1	46.6	46.8	0	46.8	1.6	5.0	0	6.6	0
99HJB 0097	308	103.1	29.1	9.9	3.1	42.1	53.1	0	53.1	1.7	3.1	0	4.8	0
99HJB 0105	317	103.5	0.8	0.1	0.0	0.9	80.6	0	80.6	2.3	16.1	0	18.5	0
Mean	N/A	N/A	27.4	9.9	3.0	41.7	50.0	0.0	52.8	3.3	8.7	0.0	16.1	0.0
Median	N/A	N/A	27.4	9.9	3.0	41.7	50.0	0.0	52.8	3.3	8.7	0.0	16.1	0.0
Standard Deviation	N/A	N/A	10.6	5.3	2.7	13.9	14.0	1.8	14.1	2.5	3.8	2.7	5.0	0.8
Range	N/A	N/A	35.7	21.2	9.5	49.9	52.9	6.5	51.8	9.0	13.1	10.3	13.7	2.8
Minimum	N/A	N/A	0.8	0.1	0.0	0.9	27.6	0.0	28.8	0.0	3.1	0.0	4.8	0.0
Maximum	N/A	N/A	36.6	21.3	9.5	50.8	80.6	6.5	80.6	9.0	16.1	10.3	18.6	2.8

Appendix 9:
Visible Gold Grain Analysis

a) Summary includes Table and Distribution Map
b) Tabling Data and Sample Description
c) Weight Data - Heavy Liquid Separation
d) Gold Grain Descriptions

Appendix 9a: Summary
Visible Gold Grains

Regional samples (55M7 and M/10)

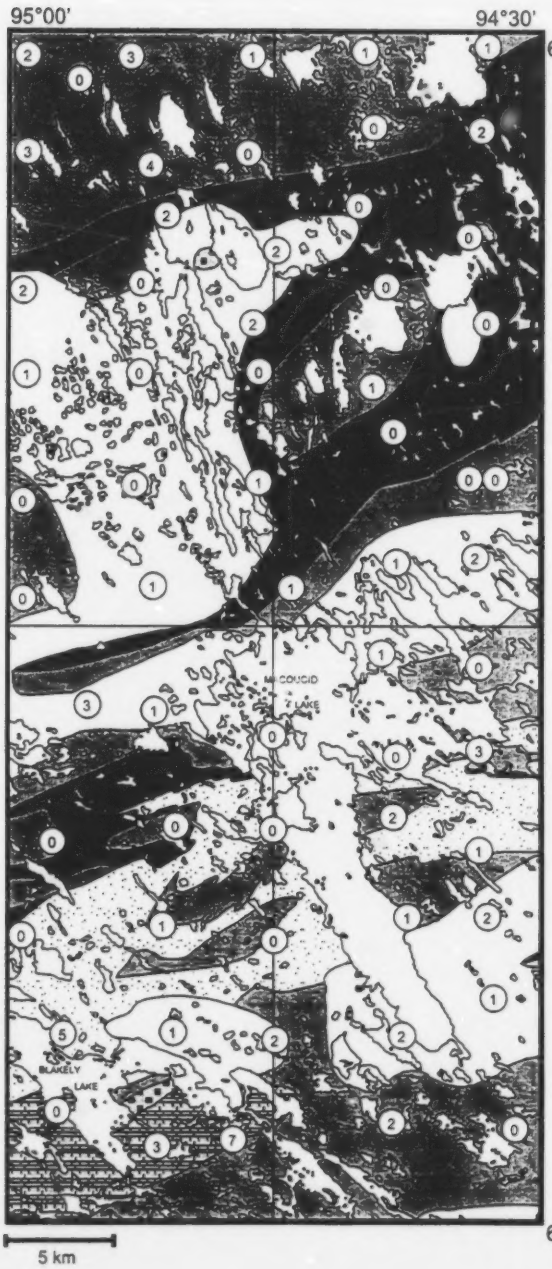
Sample No	Number of Visible Gold Grains				Non-mag. Weight	Calculated PPB Visible Gold			
	Total	Reshaped	Modified	Pristine		Total	Reshaped	Modified	Pristine
98HJB 0010	0	0	0	0	12.8	0	0	0	0
98HJB 0011	2	2	0	0	12.4	151	151	0	0
98HJB 0012	1	1	0	0	30.6	1	1	0	0
98HJB 0013	1	1	0	0	29.8	6	6	0	0
98HJB 0014	1	1	0	0	18.4	10	10	0	0
98HJB 0015	0	0	0	0	20.8	0	0	0	0
98HJB 0016	0	0	0	0	10.4	0	0	0	0
98HJB 0017	2	2	0	0	15.6	7	7	0	0
98HJB 0018	0	0	0	0	5.6	0	0	0	0
98HJB 0019	3	3	0	0	27.2	11	11	0	0
98HJB 0020	0	0	0	0	23.4	0	0	0	0
98HJB 0021	0	0	0	0	21.2	0	0	0	0
98HJB 0022	2	2	0	0	11.6	9	9	0	0
98HJB 0023	1	1	0	0	26.4	14	14	0	0
98HJB 0024	0	0	0	0	18.6	0	0	0	0
98HJB 0025	0	0	0	0	29.6	0	0	0	0
98HJB 0026	1	1	0	0	9.2	3	3	0	0
98HJB 0027	2	2	0	0	27.6	27	27	0	0
98HJB 0029	0	0	0	0	29.6	0	0	0	0
98HJB 0030	1	1	0	0	15.8	24	24	0	0
98HJB 0031	1	1	0	0	15.6	1027	1027	0	0
98HJB 0032	1	1	0	0	19.4	10	10	0	0
98HJB 0033	1	1	0	0	19.6	4	4	0	0
98HJB 0034	3	3	0	0	17.6	16	16	0	0
98HJB 0035	0	0	0	0	17.4	0	0	0	0
98HJB 0036	2	2	0	0	20.2	36	36	0	0
98HJB 0037	3	3	0	0	21.6	96	96	0	0
98HJB 0038	3	2	1	0	17.6	127	122	5	0
98HJB 0039	1	1	0	0	20.0	1	1	0	0
98HJB 0040	4	4	0	0	22.2	16	16	0	0
98HJB 0041	0	0	0	0	20.6	0	0	0	0
98HJB 0042	0	0	0	0	16.8	0	0	0	0
98HJB 0043	0	0	0	0	18.8	0	0	0	0
98HJB 0044	2	2	0	0	18.6	82	82	0	0
98HJB 0045	0	0	0	0	18.0	0	0	0	0
98HJB 0046	0	0	0	0	19.2	0	0	0	0
98HJB 0047	0	0	0	0	20.8	0	0	0	0
98HJB 0048	2	2	0	0	16.8	131	131	0	0
98HJB 0049	0	0	0	0	19.2	0	0	0	0
98HJB 0050	1	1	0	0	18.2	20	20	0	0
98HJB 0051	0	0	0	0	14.8	0	0	0	0
98HJB 0052	0	0	0	0	14.6	0	0	0	0
98HJB 0054	0	0	0	0	4.6	0	0	0	0
98HJB 0056	0	0	0	0	17.8	0	0	0	0
98HJB 0057	1	1	0	0	14.0	27	27	0	0
98HJB 0059	5	5	0	0	20.4	54	54	0	0
98HJB 0060	0	0	0	0	16.8	0	0	0	0
98HJB 0061	1	1	0	0	21.6	69	69	0	0
98HJB 0062	1	1	0	0	16.8	11	11	0	0
98HJB 0063	2	2	0	0	16.0	45	45	0	0
98HJB 0064	0	0	0	0	18.2	0	0	0	0
98HJB 0065	2	2	0	0	20.4	50	50	0	0
98HJB 0066	0	0	0	0	14.6	0	0	0	0
98HJB 0067	1	1	0	0	19.6	10	10	0	0
98HJB 0068	2	2	0	0	16.4	3	3	0	0
98HJB 0069	0	0	0	0	19.6	0	0	0	0
98HJB 0070	1	1	0	0	18.8	4	4	0	0
98HJB 0071	2	2	0	0	18.4	39	39	0	0
98HJB 0072	0	0	0	0	9.8	0	0	0	0
98HJB 0073	3	2	0	1	18.0	23	15	0	8
98HJB 0074	7	7	0	0	14.4	77	77	0	0
98HJB 0075	2	2	0	0	19.2	8	8	0	0

Additional samples (55M)

Sample No	Number of Visible Gold Grains				Non-mag. Weight	Calculated PPB Visible Gold			
	Total	Reshaped	Modified	Pristine		Total	Reshaped	Modified	Pristine
98HJB 0001	6	6	0	0	11.6	144	144	0	0
98HJB 0002	8	8	0	0	14.4	107	107	0	0
98HJB 0003	12	10	1	1	17.2	93	71	1	22
98HJB 0004	1	0	1	0	17.2	22	0	22	0
98HJB 0005	1	0	1	0	14.0	14	0	14	0
98HJB 0006	11	10	1	0	17.2	1865	1864	1	0
98HJB 0007	9	7	1	1	15.2	81	74	2	5
98HJB 0008	0	0	0	0	14.8	0	0	0	0
98HJB 0009	2	2	0	0	12.4	46	46	0	0

Gold analyses by Overburden Drilling Management, Nepean, Ontario

Visible Gold Grains in the MacQuoid Lake area (55 M/7 AND M/10)



(2) Sample location with number of grains

- Glacial Deposits
- Orthogneiss
- Granitoid Rocks; quartz diorite, granite
- Gabbro
- Metasedimentary Rocks
- Metavolcanic Rocks; basalt to andesite
- Metavolcanic Rocks; intermediate to felsic

Generalized from Tella 1997et al.

Appendix 9b: Tabling Data, Gold Grain Analysis

SAMPLE NUMBER	WEIGHT (KILOGRAMS)					SAMPLE DESCRIPTION												CLASS
						CLASTS >2.0 mm					MATRIX <2.0 mm							
							PERCENTAGE				DISTRIBUTION				COLOUR			
	Bulk Rec'd	Table Split	+2 mm Clasts	1-2 mm Clasts	Table Feed	SIZE	V/S	GR	LS	OT	S/U	SD	ST	CY	SAND	CLAY	ORG	
98HJB0010	4.2	3.8	0.6	NA	3.2	P	50	50	0	0	U	Y	Y	Y				
98HJB0011	3.8	3.4	0.3	NA	3.1	P	60	40	0	0	U	Y	Y	Y	PK	PK		TILL
98HJB0012	9.40	8.90	1.25	NA	7.65	P	70	30	0	0	U	Y	Y	Y	PK	PK		TILL
98HJB0013	9.20	8.80	1.35	NA	7.45	P	60	40	0	0	U	Y	Y	Y	PK	PK		TILL
98HJB0014	6.15	5.65	1.05	NA	4.60	P	60	40	0	0	U	Y	Y	Y	PK	PK		TILL
98HJB0015	6.90	6.30	1.10	NA	5.20	P	50	50	0	0	U	Y	Y	Y	PK	PK		TILL
98HJB0016	3.90	3.60	1.00	NA	2.60	P	80	20	0	0	U	Y	Y	Y	PK	PK		TILL
98HJB0017	5.40	4.90	1.00	NA	3.90	P	70	30	0	0	U	Y	Y	Y	PK	PK		TILL
98HJB0018	1.90	1.60	0.20	NA	1.40	P	80	20	0	0	U	Y	Y	Y	PK	PK		TILL
98HJB0019	9.05	8.65	1.85	NA	6.80	P	80	20	0	0	U	Y	Y	Y	PK	PK		TILL
98HJB0020	8.05	7.50	1.65	NA	5.85	P	60	40	0	0	U	Y	Y	Y	PK	PK		TILL
98HJB0021	6.80	6.40	1.10	NA	5.30	P	70	30	0	0	U	Y	Y	Y	PK	PK		TILL
98HJB0022	3.95	3.70	0.80	NA	2.90	P	60	40	0	0	U	Y	Y	Y	PK	PK		TILL
98HJB0023	8.20	7.70	1.10	NA	6.60	P	30	70	0	0	U	Y	Y	Y	PK	PK		TILL
98HJB0024	5.65	5.20	1.55	NA	3.65	P	60	40	0	0	U	Y	Y	Y	PK	PK		TILL
98HJB0025	9.05	8.60	1.20	NA	7.40	P	60	40	0	0	U	Y	Y	Y	PK	PK		TILL
98HJB0026	3.05	2.85	0.55	NA	2.30	P	60	40	0	0	U	Y	Y	Y	PK	PK		TILL
98HJB0027	9.05	8.50	1.60	NA	6.90	P	70	30	0	0	U	Y	Y	Y	PK	PK		TILL
98HJB0029	9.20	8.70	1.30	NA	7.40	P	50	50	0	0	U	Y	Y	Y	PK	PK		TILL
98HJB0030	5.50	5.15	1.20	NA	3.95	P	70	30	0	0	U	Y	Y	Y	PK	PK		TILL
98HJB0031	5.45	4.95	1.05	NA	3.90	P	80	20	0	0	U	Y	Y	Y	PK	PK		TILL
98HJB0032	7.00	6.50	1.65	NA	4.85	P	80	20	0	0	U	Y	Y	Y	PK	PK		TILL
98HJB0033	6.40	5.90	1.00	NA	4.90	P	40	60	0	0	U	Y	Y	Y	PK	PK		TILL
98HJB0034	6.00	5.50	1.10	NA	4.40	P	60	40	0	0	U	Y	Y	Y	PK	PK		TILL
98HJB0035	5.60	5.25	0.90	NA	4.35	P	60	40	0	0	U	Y	Y	Y	PK	PK		TILL
98HJB0036	7.35	6.90	1.85	NA	5.05	P	70	30	0	0	U	Y	Y	Y	PK	PK		TILL
98HJB0037	6.65	6.20	0.80	NA	5.40	P	70	30	0	0	U	Y	Y	Y	PK	PK		TILL
98HJB0038	5.70	5.25	0.85	NA	4.40	P	80	20	0	0	U	Y	Y	Y	PK	PK		TILL
98HJB0039	6.25	5.75	0.75	NA	5.00	P	80	20	0	0	U	Y	Y	Y	PK	PK		TILL
98HJB0040	6.95	6.50	0.95	NA	5.55	P	70	30	0	0	U	Y	Y	Y	PK	PK		TILL
98HJB0041	6.30	5.85	0.70	NA	5.15	P	70	30	0	0	U	Y	Y	Y	PK	PK		TILL
98HJB0042	5.30	4.95	0.75	NA	4.20	P	70	30	0	0	U	Y	Y	Y	PK	PK		TILL
98HJB0043	6.50	6.10	1.40	NA	4.70	P	60	40	0	0	U	Y	Y	Y	PK	PK		TILL
98HJB0044	5.90	5.45	0.80	NA	4.65	P	70	30	0	0	U	Y	Y	Y	PK	PK		TILL
98HJB0045	5.40	5.50	1.00	NA	4.50	P	60	40	0	0	U	Y	Y	Y	PK	PK		TILL
98HJB0046	5.95	5.50	0.70	NA	4.80	P	60	40	0	0	U	Y	Y	Y	PK	PK		TILL
98HJB0047	6.30	5.90	0.70	NA	5.20	P	40	60	0	0	U	Y	Y	Y	PK	PK		TILL
98HJB0048	5.60	5.15	0.95	NA	4.20	P	80	20	0	0	U	Y	Y	Y	PK	PK		TILL
98HJB0049	6.30	5.70	0.90	NA	4.80	P	60	40	0	0	U	Y	Y	Y	PK	PK		TILL
98HJB0050	5.80	5.40	0.85	NA	4.55	P	70	30	0	0	U	Y	Y	Y	PK	PK		TILL
98HJB0051	4.80	4.40	0.70	NA	3.70	P	70	30	0	0	U	Y	Y	Y	PK	PK		TILL
98HJB0052	4.95	4.45	0.80	NA	3.65	P	70	30	0	0	U	Y	Y	Y	PK	PK		TILL
98HJB0054	1.40	1.20	0.05	NA	1.15	P	60	40	0	0	U	+	-	-	DOC	DOC		TILL
98HJB0056	5.75	5.25	0.80	NA	4.45	P	80	20	0	0	U	Y	Y	Y	PK	PK		TILL
98HJB0057	4.70	4.40	0.90	NA	3.50	P	70	30	0	0	U	Y	Y	Y	PK	PK		TILL
98HJB0059	6.40	6.00	0.90	NA	5.10	P	40	60	0	0	U	Y	Y	Y	PK	PK		TILL
98HJB0060	5.60	5.15	0.95	NA	4.20	P	80	20	0	0	U	Y	Y	Y	PK	PK		TILL
98HJB0061	6.00	5.60	0.20	NA	5.40	P	70	30	0	0	U	Y	Y	Y	MOC	MOC		TILL
98HJB0062	5.35	4.95	0.75	NA	4.20	P	80	20	0	0	U	Y	Y	Y	PK	PK		TILL
98HJB0063	5.40	5.10	1.10	NA	4.00	P	70	30	0	0	U	Y	Y	Y	PK	PK		TILL
98HJB0064	5.80	5.35	0.80	NA	4.55	P	60	40	0	0	U	Y	Y	Y	PK	PK		TILL
98HJB0065	6.30	5.80	0.70	NA	5.10	P	80	20	0	0	U	Y	Y	Y	PK	PK		TILL
98HJB0066	4.90	4.45	0.80	NA	3.65	P	70	30	0	0	U	Y	Y	Y	PK	PK		TILL
98HJB0067	6.00	5.50	0.60	NA	4.90	P	70	30	0	0	U	Y	Y	Y	PK	PK		TILL
98HJB0068	5.20	4.75	0.65	NA	4.10	P	70	30	0	0	U	Y	Y	Y	PK	PK		TILL
98HJB0069	6.30	5.90	1.00	NA	4.90	P	70	30	0	0	U	Y	Y	Y	PK	PK		TILL
98HJB0070	5.75	5.30	0.60	NA	4.70	P	70	30	0	0	U	Y	Y	Y	PK	PK		TILL
98HJB0071	6.20	5.80	1.20	NA	4.60	P	50	50	0	0	U	Y	Y	Y	PK	PK		TILL
98HJB0072	3.85	3.40	0.95	NA	2.45	P	60	40	0	0	U	Y	Y	Y	PK	PK		TILL
98HJB0073	6.0	5.6	1.1	NA	4.5	P	70	30	0	0	U	Y	Y	Y	PK	PK		TILL
98HJB0074	5.3	4.8	1.2	NA	3.6	P	60	40	0	0	U	Y	Y	Y	PK	PK		TILL
98HJB0075	5.8	5.4	0.6	NA	4.8	P	60	40	0	0	U	Y	Y	Y	PK	PK		TILL

Sample Number	TABLE CONCENTRATE <2.0 mm (grams)									% Magnetic of Total Weight
		M.I. SEPARATION S.G 3.20								
				Nonmag						
	TOTAL	M.I. Lights	Total Mag	Total	-0.25 mm	<0.25 mm (wash)	0.25 to 0.5 mm	0.5 to 1.0 mm	1.0 to 2.0 mm	
98HJB0010	399.6	380.7	1.5	17.4	11.9	0.7	4.4	0.3	0.06	0.38
98HJB0011	560.4	545.9	1.1	13.4	8.4	0.7	3.9	0.3	0.1	0.20
98HJB0012	1050.7	1007.7	4.1	38.9	25.6	0.4	9.9	2.4	0.6	0.39
98HJB0013	982.7	945.6	4.4	32.7	23.5	0.2	6.5	1.9	0.6	0.45
98HJB0014	720.8	698.0	1.6	21.2	14.9	0.1	5.1	1.0	0.1	0.22
98HJB0015	618.2	589.4	1.4	27.4	18.2	1.1	6.8	1.1	0.2	0.23
98HJB0016	649.1	634.5	1.1	13.5	8.0	0.6	3.8	0.8	0.3	0.17
98HJB0017	706.8	686.7	2.7	17.4	11.4	0.2	4.5	1.1	0.2	0.38
98HJB0018	279.7	269.9	0.4	9.4	4.9	0.2	3.5	0.7	0.1	0.14
98HJB0019	997.5	983.1	1.0	13.4	7.3	0.8	4.3	0.8	0.2	0.10
98HJB0020	829.5	795.7	2.5	31.3	20.1	0.4	8.7	1.8	0.3	0.30
98HJB0021	848.9	830.5	1.6	16.8	11.3	0.1	4.2	0.9	0.3	0.19
98HJB0022	595.6	581.8	0.7	13.1	8.4	0.2	3.7	0.7	0.1	0.12
98HJB0023	901.0	869.5	1.6	29.9	20.4	0.6	7.1	1.5	0.3	0.18
98HJB0024	931.6	910.9	1.9	18.8	11.6	0.5	5.3	1.2	0.2	0.20
98HJB0025	1024.8	999.9	3.5	21.4	16.3	0.2	3.7	0.9	0.3	0.34
98HJB0026	591.3	581.1	1.0	9.2	5.8	0.2	2.6	0.5	0.1	0.17
98HJB0027	1008.4	972.0	2.1	34.3	22.7	0.6	9.1	1.6	0.3	0.21
98HJB0029	649.4	612.3	2.2	34.9	24.4	0.8	7.5	1.7	0.5	0.34
98HJB0030	516.8	495.0	1.6	20.2	14.1	0.3	4.7	1.0	0.1	0.31
98HJB0031	1013.2	989.0	1.0	23.2	14.6	0.5	6.8	1.2	0.1	0.10
98HJB0032	1153.6	1127.5	2.0	24.1	15.9	0.4	6.1	1.4	0.3	0.17
98HJB0033	645.1	621.4	1.0	22.7	14.4	1.0	6.1	1.1	0.1	0.16
98HJB0034	622.7	594.8	2.7	25.2	16.2	1.6	6.8	0.2	0.4	0.43
98HJB0035	771.4	749.6	1.0	20.8	13.4	0.4	5.8	1.1	0.1	0.13
98HJB0036	1021.2	992.9	1.4	26.9	17.3	0.5	7.4	1.6	0.1	0.14
98HJB0037	931.6	908.9	1.1	21.6	14.1	0.4	5.9	1.1	0.1	0.12
98HJB0038	809.3	788.1	1.8	19.4	13.0	0.2	4.8	1.2	0.2	0.22
98HJB0039	794.7	773.0	1.3	20.4	13.4	0.4	5.4	1.1	0.1	0.16
98HJB0040	974.8	946.5	1.8	26.5	18.6	0.3	6.2	1.2	0.2	0.18
98HJB0041	999.6	974.5	1.3	23.8	15.7	0.5	6.3	1.2	0.1	0.13
98HJB0042	739.3	719.4	1.4	18.5	12.9	0.2	4.4	0.9	0.1	0.19
98HJB0043	727.1	707.2	1.1	18.8	11.4	0.8	5.3	1.0	0.3	0.15
98HJB0044	1169.2	1150.8	0.9	17.5	11.2	0.3	4.9	1.0	0.1	0.08
98HJB0045	454.2	430.8	1.1	22.3	14.4	0.7	6.1	1.0	0.1	0.24
98HJB0046	729.8	703.7	2.1	24.0	16.2	0.3	5.9	1.4	0.2	0.29
98HJB0047	588.2	554.5	1.3	32.4	17.6	1.2	9.7	3.4	0.5	0.22
98HJB0048	791.6	774.4	0.9	16.3	10.7	0.2	4.5	0.8	0.1	0.11
98HJB0049	737.3	711.5	1.6	24.2	15.6	1.0	6.1	1.2	0.3	0.22
98HJB0050	914.5	896.7	0.8	17.0	11.5	0.3	4.4	0.8	0.0	0.09
98HJB0051	160.3	143.8	0.7	15.8	10.7	0.5	4.0	0.5	0.1	0.44
98HJB0052	1030.4	1012.2	0.6	17.6	11.1	0.4	5.0	1.0	0.1	0.06
98HJB0054	234.4	227.6	0.2	6.6	5.5	0.5	0.6	0.0	0.0	0.09
98HJB0056	1231.6	1210.8	1.3	19.5	13.1	0.3	5.1	0.9	0.1	0.11
98HJB0057	792.4	774.0	1.0	17.4	11.5	0.4	4.4	0.9	0.2	0.13
98HJB0059	876.2	851.2	1.7	23.3	15.9	0.8	5.1	1.1	0.4	0.19
98HJB0060	1198.8	1179.9	0.9	18.0	11.4	0.3	5.1	1.1	0.1	0.08
98HJB0061	617.4	604.9	0.2	12.3	9.1	1.0	2.0	0.2	0.0	0.03
98HJB0062	779.5	758.0	1.5	20.0	13.2	0.6	5.1	1.0	0.1	0.19
98HJB0063	433.2	413.6	0.9	18.7	11.9	0.6	5.1	0.9	0.2	0.21
98HJB0064	947.1	929.2	1.1	16.8	11.3	0.3	4.2	0.9	0.1	0.12
98HJB0065	612.7	586.0	1.8	24.9	16.3	0.9	6.3	1.2	0.2	0.29
98HJB0066	717.8	701.1	1.3	15.4	10.3	0.3	3.8	0.8	0.2	0.18
98HJB0067	776.3	755.5	1.3	19.5	12.9	0.1	5.2	1.0	0.3	0.17
98HJB0068	1153.8	1133.6	1.4	18.8	12.9	0.3	4.5	0.9	0.2	0.12
98HJB0069	649.7	623.2	1.8	24.7	17.5	0.4	5.6	1.0	0.2	0.28
98HJB0070	1206.8	1184.1	1.5	21.2	14.0	0.4	5.7	1.0	0.1	0.12
98HJB0071	752.5	725.0	2.2	25.3	16.6	0.5	6.7	1.3	0.2	0.29
98HJB0072	684.6	670.3	1.2	13.1	7.3	0.6	4.1	0.9	0.2	0.18
98HJB0073	455.8	435.9	2.3	17.6	11.8	0.9	4.5	0.3	0.1	0.50
98HJB0074	689.9	666.0	2.5	21.4	14.3	1.4	5.1	0.3	0.3	0.36
98HJB0075	660.1	640.3	2.0	17.8	12.2	0.9	4.3	0.3	0.1	0.30

Visible Gold from Shaking Table and Panning

Sample No	Size (Microns)		Number of Grains				Non mag.	Calc. v.g.
	Diameter	Thickness	Reshaped	Modified	Pristine	Total	GMS	Assay PPB
98HJB 0010	No visible gold							
98HJB 0011	50 x 75	13	1			1		
	75 x 125	20	1			1		
						2	12.4	151
98HJB 0012	25 x 25	5	1			1		
						1	30.6	1
98HJB 0013	25 x 75	10	1			1		
						1	29.8	6
98HJB 0014	25 x 75	10	1			1		
						1	18.4	10
98HJB 0015	No visible gold							
98HJB 0016	No visible gold							
98HJB 0018	No visible gold							
98HJB 0017	25 x 25	5	1			1		
	25 x 50	8	1			1		
						2	15.6	7
98HJB 0019	25 x 25	5	1			1		
	25 x 50	8	1			1		
	25 x 75	10	1			1		
						3	27.2	11
98HJB 0020	No visible gold							
98HJB 0021	No visible gold							
98HJB 0022	25 x 25	5	1			1		
	25 x 50	8	1			1		
						2	11.6	9
98HJB 0023	50 x 75	13	1			1		
						1	26.4	14
98HJB 0024	No visible gold							
98HJB 0025	No visible gold							
98HJB 0026	25 x 25	5	1			1		
						1	9.2	3
98HJB 0027	50 x 75	13	2			2		
						2	27.6	27
98HJB 0029	No visible gold							
98HJB 0030	50 x 75	13	1			1		
						1	15.8	24
98HJB 0031	150 x 300	42	1			1		
						1	15.6	1027
98HJB 0032	50 x 50	10	1			1		
						1	19.4	10
98HJB 0033	25 x 50	8	1			1		
						1	19.6	4

Appendix 9d: Gold Grain Descriptions

Sample No	Size (Microns)		Number of Grains				Non mag.	Calc. v.g.
	Diameter	Thickness	Reshaped	Modified	Pristine	Total	GMS	Assay PPB
98HJB 0034	15 x 25	4	1			1		
	25 x 50	8	1			1		
	25 x 75	10	1			1		
						3	17.6	16
98HJB 0035	No visible gold							
98HJB 0036	25 x 50	8	1			1		
	50 x 100	15	1			1		
						2	20.2	36
98HJB 0037	25 x 75	10	1			1		
	50 x 75	13	1			1		
	75 x 125	20	1			1		
						3	21.6	96
98HJB 0038	25 x 25	5	1			1		
	25 x 50	8		1		1		
	75 x 150	22	1			1		
						3	17.6	127
98HJB 0039	25 x 25	5	1			1		
						1	20.0	1
98HJB 0040	15 x 50	7	1			1		
	25 x 25	5	1			1		
	25 x 50	8	1			1		
	25 x 75	10	1			1		
						4	22.2	16
98HJB 0041	No visible gold							
98HJB 0042	No visible gold							
98HJB 0043	No visible gold							
98HJB 0044	25 x 25	5	1			1		
	75 x 125	20	1			1		
						2	18.6	82
98HJB 0045	No visible gold							
98HJB 0046	No visible gold							
98HJB 0047	No visible gold							
98HJB 0048	25 x 50	8	1			1		
	75 x 150	22	1			1		
						2	16.8	131
98HJB 0049	No visible gold							
98HJB 0050	50 x 75	13	1			1		
						1	18.2	20
98HJB 0051	No visible gold							
98HJB 0052	No visible gold							
98HJB 0054	No visible gold							
98HJB 0056	No visible gold							
98HJB 0057	50 x 75	13	1			1		
						1	14.0	27

Appendix 9d: Gold Grain Descriptions

Sample No	Size (Microns)		Number of Grains				Non mag.	Calc. v.g.
	Diameter	Thickness	Reshaped	Modified	Pristine	Total	GMS	Assay PPB
98HJB 0059	25 x 50	8	2			2		
	50 x 50	10	1			1		
	50 x 75	13	2			2		
						5	20.4	54
98HJB 0060	No visible gold							
98HJB 0061	75 x 125	20	1			1		
						1	21.6	69
98HJB 0062	25 x 75	10	1			1		
						1	16.8	11
98HJB 0063	25 x 50	8	1			1		
	75 x 75	15	1			1		
						2	16.0	45
98HJB 0064	No visible gold							
98HJB 0065	50 x 75	13	1			1		
	75 x 75	15	1			1		
						2	20.4	50
98HJB 0066	No visible gold							
98HJB 0067	50 x 50	10	1			1		
						1	19.6	10
98HJB 0068	25 x 25	5	2			2		
						2	16.4	3
98HJB 0069	No visible gold							
98HJB 0070	25 x 50	8	1			1		
						1	18.8	4
98HJB 0071	25 x 50	8	1			1		
	50 x 100	15	1			1		
						2	18.4	39
98HJB 0072	No visible gold							
98HJB 0073	15 x 75	5			1	1		
	25 x 50	8	1			1		
	50 x 50	10	1			1		
						3	18.0	23
98HJB 0074	15 x 25	4	1			1		
	25 x 25	5	1			1		
	25 x 50	8	3			3		
	50 x 50	10	1			1		
	50 x 100	15	1			1		
						7	14.4	77
98HJB 0075	25 x 50	8	2			2		
						2	19.2	8

Appendix 10:

Analytical Precision and Accuracy

Analytical Duplicates
Regional sediment samples (< 0.002 mm fraction)
ICP-AES (aqua-regia leach)

Geochemical Data

Sample No.		Al (%)		As (ppm)		Ba (ppm)		Ca (%)		Co (ppm)		Cr (ppm)		Cu (ppm)		Fe (%)	
Original	Duplicate	Original	Duplicate	Original	Duplicate	Original	Duplicate	Original	Duplicate	Original	Duplicate	Original	Duplicate	Original	Duplicate	Original	Duplicate
98PL 0425	98HJB 0021	2.64	3 5	10	10	220	280	0.29	0.37	11	14	52	61	46	49	3.67	4.2
98PL 0426	98HJB 0035	2.15	2.64	8	8	330	350	0.26	0.29	9	10	41	44	27	26	3.06	3.27
98PL 0427	98HJB 0049	2 21	2 73	14	14	190	200	0 21	0.25	10	11	48	54	46	45	2.99	3.3
98PL 0429	98HJB 0064	2.32	2.56	12	8	280	300	0.32	0.34	10	11	45	49	41	47	3 41	3 7
98PL 0430	98HJB 0070	2 76	2.46	8	12	270	270	0.29	0.27	12	11	50	48	34	39	3.9	3.84

Sample No.		K (%)		La (ppm)		Mg (%)		Mn (ppm)		Na (%)		Ni (ppm)		P (ppm)		Pb (ppm)	
Original	Duplicate	Original	Duplicate	Original	Duplicate	Original	Duplicate	Original	Duplicate	Original	Duplicate	Original	Duplicate	Original	Duplicate	Original	Duplicate
98PL 0425	98HJB 0021	0 63	0.76	70	70	1 11	1 33	380	445	0 39	0 48	28	33	1800	3010	22	22
98PL 0426	98HJB 0035	0 43	0 5	70	70	0 84	0 96	300	335	0 27	0 27	19	22	1600	1580	18	22
98PL 0427	98HJB 0049	0 42	0 47	60	70	0 84	1	365	415	0 36	0 35	24	29	1910	1770	24	28
98PL 0429	98HJB 0064	0 49	0 53	70	80	0 99	1 1	335	370	0 35	0 39	24	28	2120	2240	18	22
98PL 0430	98HJB 0070	0 57	0 56	70	70	1 02	0 95	415	395	0 36	0 38	27	24	1950	1970	24	22

Sample No.		Sr (ppm)		Ti (%)		V (ppm)		Zn (ppm)		LOI (%)	
Original	Duplicate	Original	Duplicate	Original	Duplicate	Original	Duplicate	Original	Duplicate	Original	Duplicate
98PL 0425	98HJB 0021	117	147	0 07	0 08	49	51	78	92	3.4	3.6
98PL 0426	98HJB 0035	176	210	0.04	0.04	37	40	54	58	3.2	3.2
98PL 0427	98HJB 0049	164	195	0.04	0.04	45	50	54	60	4.6	4.8
98PL 0429	98HJB 0064	153	151	0 05	0 06	42	47	66	72	2.8	3.2
98PL 0430	98HJB 0070	129	119	0 07	0 07	49	51	78	76	3.4	3.2

Statistical Determination of Precision

	Al	As	Ba	Ca	Co	Cr	Cu	Fe	K	La	Mg	Mn	Na	Ni	P	Pb	Sr	Ti	V	Zn	LOI
sum of squares	1.40	32	4500	0.0097	13	146	72	0.51	0.026	200	0 11	9575	0.010	84	1498900	52	3121	0.0002	67	288	0.28
number of pairs N	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
analytical variance	0 14	3 2	450	0 00097	1 3	14.6	7 2	0 0508 8	0.0026	20	0 011	957 5	0.0010	8.4	149890	5.2	312.1	0.00002	6.7	28.8	0.028
standard deviation	0.37	1.79	21.21	0.03	1.14	3.82	2.68	0.23	0.05	4 47	0 10	30.94	0.03	2.90	387.16	2.28	17.67	0.00	2.59	5.37	0.17
Mean	2 60	10 4	269	0 289	10 9	49 2	40	3 534	0 536	70	1 014	375 5	0 36	25 8	1995	22 2	156.1	0.056	46.1	68.8	3.54
Precision (± %)	**14.40**	**17.20**	**7.89**	**10.78**	**10.46**	**7.77**	**6.71**	**6.38**	**9.51**	**6.39**	**10.12**	**8.24**	**8.87**	**11.23**	**19.41**	**10.27**	**11.32**	**7.99**	**5.61**	**7.80**	**4.73**
data variance	0 11	6 80	3121.25	0 0020	1 61	23 70	69 50	0 17	0 0092	25 00	0 018	2257 81	0 0023	14 75	54731.25	10.45	682.81	0.00024	29.41	153.80	0.46
F: variance ratio	0 81	2 13	6.94	2 07	1 24	1 62	9.65	3.38	3.54	1 25	1 67	2 36	2 23	1 76	0 37	2 01	2 19	11.75	4.39	5.34	16.30

Analytical Duplicates
Regional samples (< 0.063 mm fraction)
ICP-AES (aqua-regia leach)

Geochemical Data

Sample No.		Au (ppb)		Pt (ppb)		Pd (ppb)		Al (%)		As (ppm)		Ba (ppm)		Ca (%)		Co (ppm)	
Original	Duplicate	Original	Duplicate	Original	Duplicate	Original	Duplicate	Original	Duplicate	Original	Duplicate	Original	Duplicate	Original	Duplicate	Original	Duplicate
98PL 0432	98HJB 0003	12	48	5	< 5	8	4	1.12	1.06	< 2	2	120	110	0.55	0.48	8	9
98PL 0433	98HJB 0017	6	< 2	< 5	< 5	< 2	4	0.45	0.43	2	2	70	70	0.33	0.3	3	3
98PL 0434	98HJB 0031	26	< 2	< 5	10	< 2	8	1.32	0.99	2	6	290	240	0.3	0.24	5	4
98PL 0436	98HJB 0061	18	< 2	< 5	< 5	< 2	< 2	0.92	0.89	2	6	120	110	0.21	0.2	4	3
98PL 0437	98HJB 0068	10	< 2	< 5	< 5	< 2	< 2	0.76	0.78	2	< 2	110	90	0.36	0.35	4	4

Sample No.		Cr (ppm)		Cu (ppm)		Fe (%)		K (%)		La (ppm)		Mg (%)		Mn (ppm)		Ni (ppm)	
Original	Duplicate	Original	Duplicate	Original	Duplicate	Original	Duplicate	Original	Duplicate	Original	Duplicate	Original	Duplicate	Original	Duplicate	Original	Duplicate
98PL 0432	98HJB 0003	30	29	25	25	1.95	1.85	0.18	0.17	40	30	0.63	0.61	255	240	19	19
98PL 0433	98HJB 0017	12	11	5	4	1.19	1.15	0.06	0.05	30	30	0.21	0.21	135	125	6	5
98PL 0434	98HJB 0031	23	20	15	14	1.59	1.42	0.24	0.16	30	30	0.41	0.35	165	155	11	11
98PL 0436	98HJB 0061	22	22	8	9	1.54	1.58	0.09	0.08	40	40	0.32	0.33	85	80	9	9
98PL 0437	98HJB 0068	16	15	10	10	1.3	1.32	0.14	0.14	30	30	0.29	0.28	145	145	8	8

Sample No.		P (ppm)		Pb (ppm)		Sr (ppm)		Ti (%)		V (ppm)		Zn (ppm)		LOI (%)	
Original	Duplicate	Original	Duplicate	Original	Duplicate	Original	Duplicate	Original	Duplicate	Original	Duplicate	Original	Duplicate	Original	Duplicate
98PL 0432	98HJB 0003	990	1000	4	6	52	41	0.09	0.07	31	29	32	32	0.6	1
98PL 0433	98HJB 0017	750	680	6	6	50	46	0.05	0.05	16	14	14	14	0.8	0.4
98PL 0434	98HJB 0031	680	520	10	14	82	56	0.03	0.02	21	16	26	24	1.2	1.4
98PL 0436	98HJB 0061	510	480	8	10	94	85	0.05	0.04	24	23	18	18	3	3.2
98PL 0437	98HJB 0068	730	640	8	10	72	71	0.05	0.05	18	17	20	20	1.4	0.6

Statistical Determination of Precision

	Au	Al	As	Ba	Ca	Co	Cr	Cu	Fe	K	La	Mg	Mn	Ni	P	Pb	Sr	Ti	V	Zn	LOI
sum of squares	2316	0.1142	34	3100	0.0096	3	12	3	0.0425	0.0067	3.00	0.0042	450	1	20400	28	895	0.0006	47	4	1.04
number of pairs N	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
analytical variance	231.60	0.01	3.40	310.00	0.00	0.30	1.20	0.30	0.00	0.00	10.00	0.00	45.00	0.10	2040.00	2.80	89.50	0.00	4.70	0.40	0.10
Standard deviation	15.22	0.11	1.84	17.61	0.03	0.55	1.10	0.55	0.07	0.03	3.16	0.02	6.71	0.32	45.17	1.67	9.46	0.01	2.17	0.63	0.32
Mean	12.4	0.872	2.6	131	0.332	4.7	20	12.5	1.489	0.131	33	0.364	153	10.5	690	8.2	64.9	0.05	21.1	21.8	1.36
Precision (± %)	122.73	24.27	70.92	13.24	9.33	11.65	5.48	4.38	4.38	19.76	9.58	5.63	4.38	3.01	6.55	20.41	14.58	15.49	10.27	2.90	23.71
data variance	65.80	0.11	1.00	7171.25	0.02	3.71	48.25	61.31	0.09	0.01	31.25	0.03	1890.00	29.31	31925.00	6.45	194.51	0.00	46.41	50.05	0.90
F - variance ratio	0.28	9.96	0.29	23.78	16.72	12.38	40.21	204.38	20.61	7.87	3.13	61.90	86.44	253.13	16.63	2.30	4.41	8.33	9.88	125.13	8.67

Analytical Standard
ICP-AES (aqua-regia leach)

Geochemical Data

Sample No.		Au (ppb)		Pt (ppb)		Pd (ppb)		Al (%)		As (ppm)		Ba (ppm)		Ca (%)		Co (ppm)	
Original	Duplicate	Original	Duplicate	Original	Duplicate	Original	Duplicate	Original	Duplicate	Original	Duplicate	Original	Duplicate	Original	Duplicate	Original	Duplicate
< 63um 98PL 0435	TCA8010	110	119	< 5	< 5	< 2	< 2	0.92	0.85	2	5.5	30	25.0	0.43	0.38	7	6.25
< 63um 98PL 0438	TCA8010	128	119	< 5	< 5	< 2	< 2	0.92	0.85	2	5.5	30	25.0	0.43	0.38	7	6.25
< 2um 98PL 0428	TCA8010							0.8	0.85	6	5.5	30	25.0	0.37	0.38	6	6.25
< 2um 98PL 0431	TCA8010							0.9	0.85	6	5.5	30	25.0	0.4	0.38	6	6.25

Sample No.		Cr (ppm)		Cu (ppm)		Fe (%)		K (%)		La (ppm)		Mg (%)		Mn (ppm)		Ni (ppm)	
Original	Duplicate	Original	Duplicate	Original	Duplicate	Original	Duplicate	Original	Duplicate	Original	Duplicate	Original	Duplicate	Original	Duplicate	Original	Duplicate
< 63um 98PL 0435	TCA8010	25	22.67	26	26.00	1.56	1.46	0.05	0.05	20	12.50	0.39	0.37	210	192.08	15	13.42
< 63um 98PL 0438	TCA8010	25	22.67	26	26.00	1.56	1.46	0.05	0.05	20	12.50	0.39	0.37	205	192.08	14	13.42
< 2um 98PL 0428	TCA8010	22	22.67	28	26.00	1.45	1.46	0.05	0.05	10	12.50	0.35	0.37	185	192.08	13	13.42
< 2um 98PL 0431	TCA8010	24	22.67	27	26.00	1.56	1.46	0.05	0.05	20	12.50	0.39	0.37	205	192.08	14	13.42

Sample No.		P (ppm)		Pb (ppm)		Sr (ppm)		Ti (%)		V (ppm)		Zn (ppm)		LOI (%)	
Original	Duplicate	Original	Duplicate	Original	Duplicate	Original	Duplicate	Original	Duplicate	Original	Duplicate	Original	Duplicate	Original	Duplicate
< 63um 98PL 0435	TCA8010	510	483.33	< 2	1.42	22	18.92	0.09	0.07	27	24.50	28	25.83	1.2	1.31
< 63um 98PL 0438	TCA8010	500	483.33	< 2	1.42	22	18.92	0.09	0.07	28	24.50	26	25.83	1	1.31
< 2um 98PL 0428	TCA8010	520	483.33	2	1.42	19	18.92	0.08	0.07	26	24.50	24	25.83	1.4	1.31
< 2um 98PL 0431	TCA8010	540	483.33	2	1.42	20	18.92	0.08	0.07	27	24.50	26	25.83	1.2	1.31

Statistical Determination of Accuracy

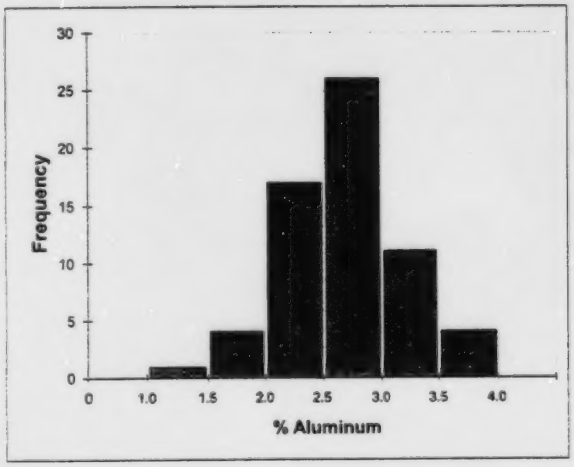
	Au	Al	As	Ba	Ca	Co	Cr	Cu	Fe	K	La	Mg	Mn	Ni	P	Pb	Sr	Ti	V	Zn	LOI
sum of squares	162	0.02	25.00	100	0.005	1.25	13.11	5.00	0.03	0.0001	175.00	0.001	704.86	3.36	5544.44	1.03	20.19	0.0006	27	8.11	0.13
number of pairs N	2	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
analytical variance	40.50	0.00	3.13	12.50	0.00	0.16	1.64	0.63	0.00	0.00	21.88	0.00	88.11	0.42	693.06	0.13	2.52	0.00	3.38	1.01	0.02
Standard deviation	6.36	0.04	1.77	3.54	0.02	0.40	1.28	0.79	0.06	0.00	4.68	0.01	9.39	0.65	26.33	0.36	1.59	0.01	1.84	1.01	0.13
Mean	119.00	0.87	4.75	27.50	0.40	6.38	23.33	26.38	1.49	0.05	15.00	0.38	196.67	13.71	500.42	1.46	19.83	0.08	25.75	25.92	1.26
Precision (± %)	5.35	5.17	37.22	12.86	6.09	6.20	5.49	3.00	4.31	7.44	31.18	3.62	4.77	4.73	5.26	24.58	8.01	11.34	7.13	3.89	10.23
data variance	162.00	0.00	6.08	8.33	0.00	0.35	2.59	1.10	0.01	0.00	33.33	0.00	150.93	0.78	680.79	0.34	3.37	0.00	2.75	2.68	0.03
F: variance ratio	4.00	1.90	1.95	0.67	1.73	2.27	1.58	1.77	1.22	0.67	1.52	2.29	1.71	1.86	0.98	2.61	1.34	0.98	0.81	2.64	1.88

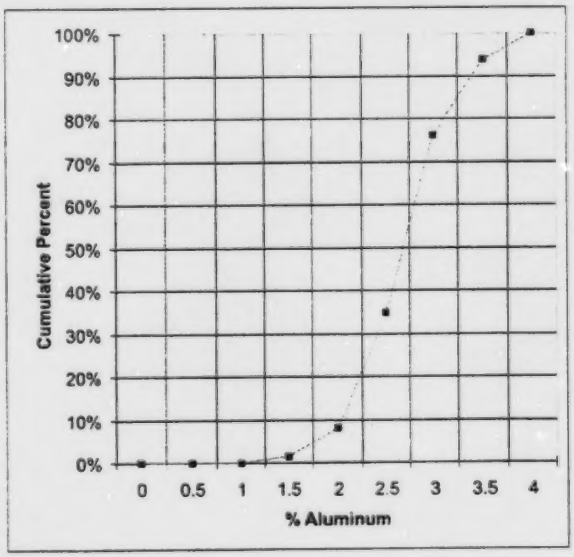
Appendix 11:

Statistics and Geochemical Maps for Regional Sediment Samples (<0.002 and <0.063 mm fractions)

Al	Sample Preparation:	Centrifuge & Decantation
Till Geochemistry	Analytical Preparation:	Nitric-aqua regia partial leach
< 0.002 mm	Analytical Method:	ICP-AES
	Detection Limit:	0.01%

Descriptive Statistics	
Mean	2.67
Standard Error	0.06
Median	2.63
Mode	2.53
Standard Deviation	0.50
Sample Variance	0.25
Kurtosis	-0.26
Skewness	0.19
Range	2.32
Minimum	1.48
Maximum	3.80
Sum	168.18
Count	63
Maximum	3.80
99th percentile	3.69
98th percentile	3.61
95th percentile	3.55
90th percentile	3.39
75th percentile	2.99
Median	2.63
25th percentile	2.33
5th percentile	1.89
Minimum	1.48

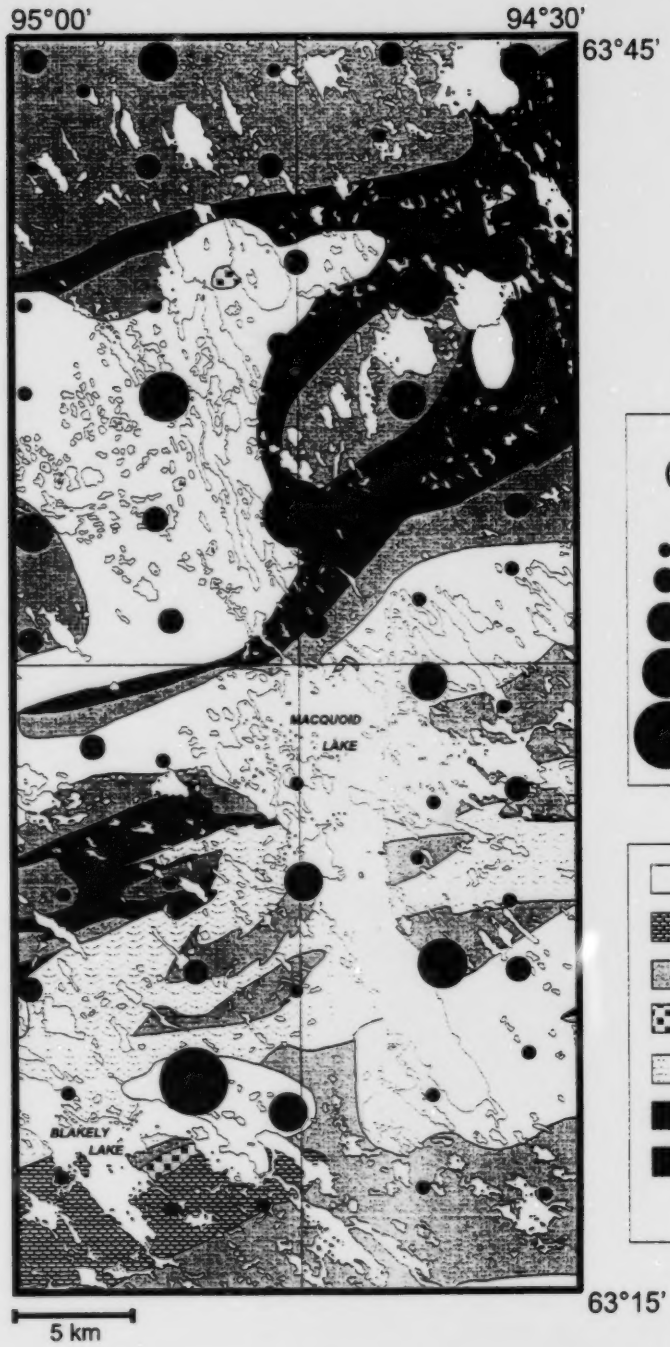




Al

Aluminum (%)

(<0.002 mm fraction)



Aluminum (%)
(<0.002 mm fraction)

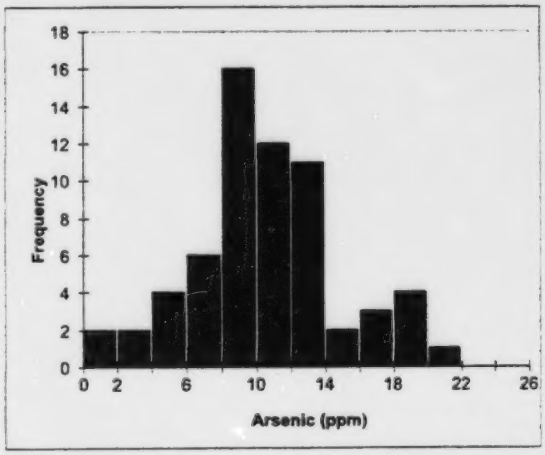
	Min	Max	%tile	# Samp
●	1.48	2.63	50th	30
●	2.63	2.99	75th	18
●	2.99	3.39	90th	8
●	3.39	3.61	98th	5
●	3.61	3.8	100th	2

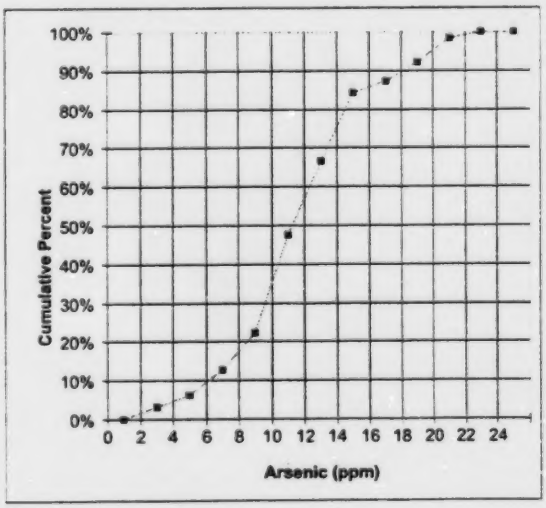
- Glacial Deposits
- Orthogneiss
- Granitoid Rocks; quartz diorite, granite
- Gabbro
- Metasedimentary Rocks
- Metavolcanic Rocks; basalt to andesite
- Metavolcanic Rocks; intermediate to felsic

Generalized from Tella *et al.*, 1997b

As	Sample Preparation:	Centrifuge & Decantation
Till Geochemistry	Analytical Preparation:	Nitric-aqua regia partial leach
< 0.002 mm	Analytical Method:	ICP-AES
	Detection Limit:	2 ppm

Descriptive Statistics	
Mean	11.57
Standard Error	0.55
Median	12.00
Mode	10.00
Standard Deviation	4.37
Sample Variance	19.06
Kurtosis	0.31
Skewness	0.14
Range	21.00
Minimum	1.00
Maximum	22.00
Sum	729.00
Count	63
Maximum	22.00
99th percentile	20.76
98th percentile	20.00
95th percentile	20.00
90th percentile	18.00
75th percentile	14.00
Median	12.00
25th percentile	10.00
5th percentile	4.20
Minimum	1.00

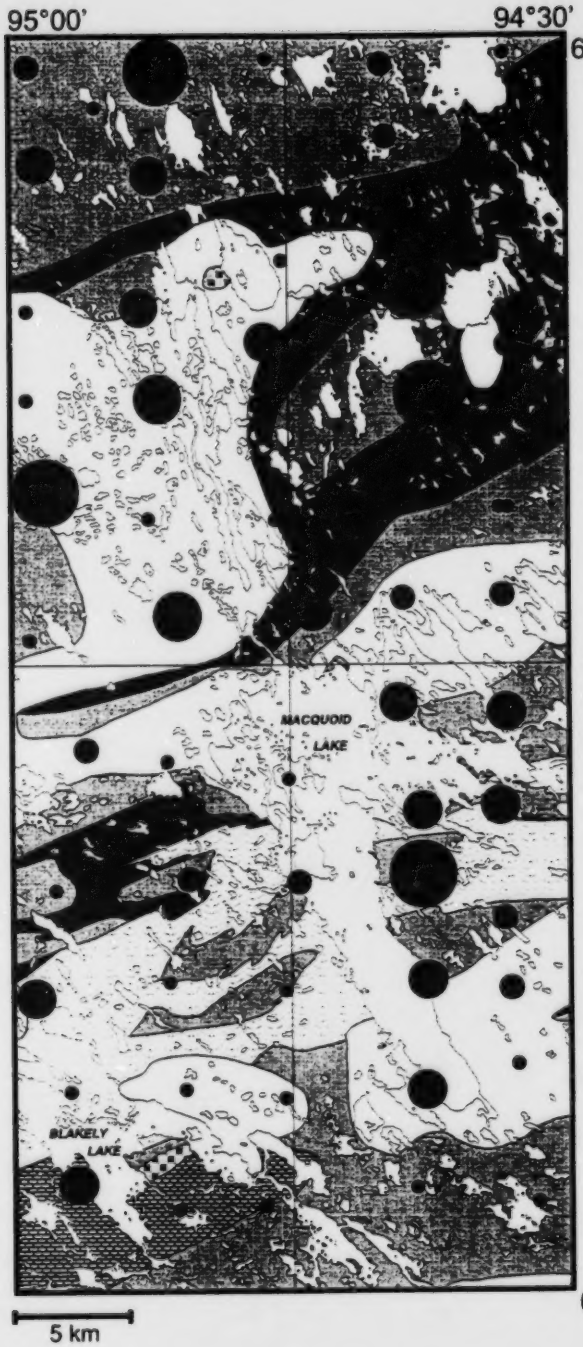




As

Arsenic (ppm)

(<0.002 mm fraction)



Arsenic (ppm)
(<0.002 mm fraction)

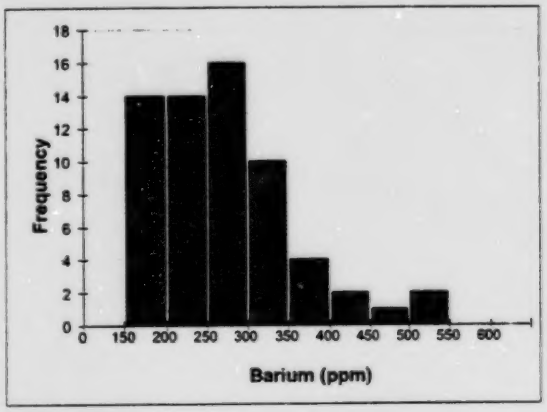
	Min	Max	%tile	# Samp
	1	12	50th	30
	12	14	75th	12
	14	18	90th	13
	18	20	98th	3
	20	22	100th	5

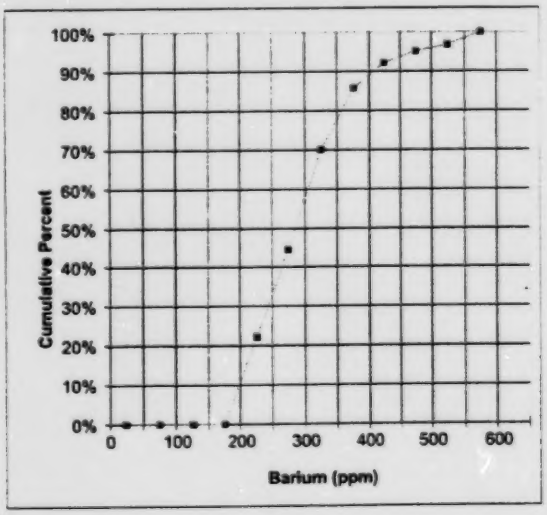
- Glacial Deposits
- Orthogneiss
- Granitoid Rocks; quartz diorite, granite
- Gabbro
- Metasedimentary Rocks
- Metavolcanic Rocks; basalt to andesite
- Metavolcanic Rocks; intermediate to felsic

Generalized from Tella *et al.*, 1997b

Ba		
Till Geochemistry	Sample Preparation:	Centrifuge & Decantation
< 0.002 mm	Analytical Preparation:	Nitric-aqua regia partial leach
	Analytical Method:	ICP-AES
	Detection Limit:	10 ppm

Descriptive Statistics	
Mean	277.30
Standard Error	10.43
Median	260.00
Mode	230.00
Standard Deviation	82.76
Sample Variance	6849.05
Kurtosis	0.93
Skewness	1.04
Range	360.00
Minimum	160.00
Maximum	520.00
Sum	17470.00
Count	63
Maximum	520.00
99th percentile	513.80
98th percentile	500.40
95th percentile	438.00
90th percentile	392.00
75th percentile	315.00
Median	260.00
25th percentile	220.00
5th percentile	171.00
Minimum	160.00

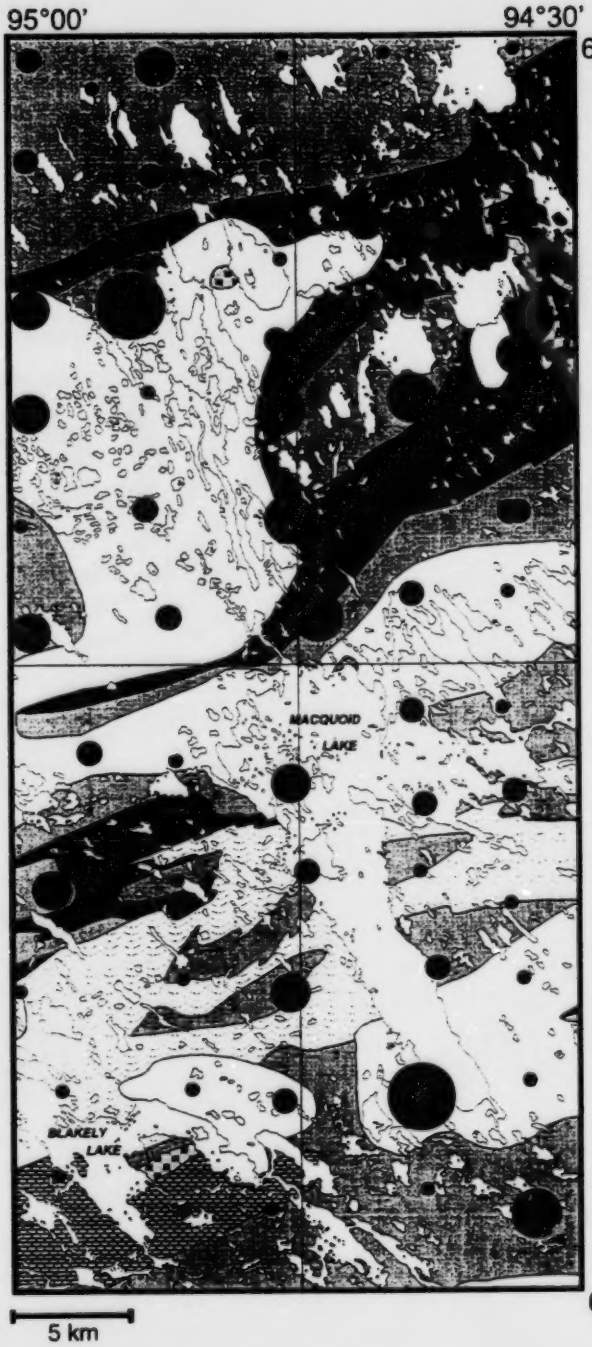




Ba

Barium (ppm)

(<0.002 mm fraction)



Barium (ppm)
(<0.002 mm fraction)

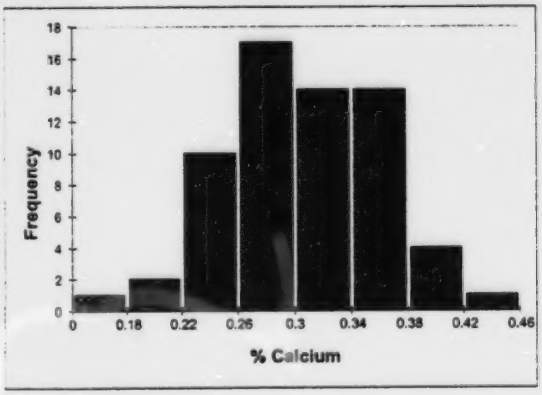
	Min	Max	%tile	# Samp
●	160	260	50th	28
●	260	315	75th	19
●	315	392	90th	9
●	392	500	98th	5
●	500	520	100th	2

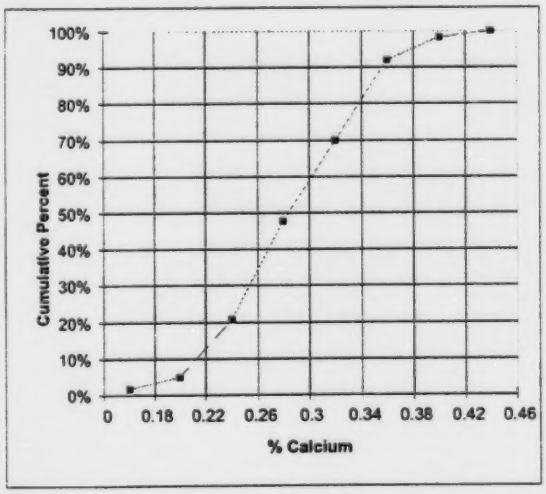
- Glacial Deposits
- Orthogneiss
- Granitoid Rocks; quartz diorite, granite
- Gabbro
- Metasedimentary Rocks
- Metavolcanic Rocks; basalt to andesite
- Metavolcanic Rocks; intermediate to felsic

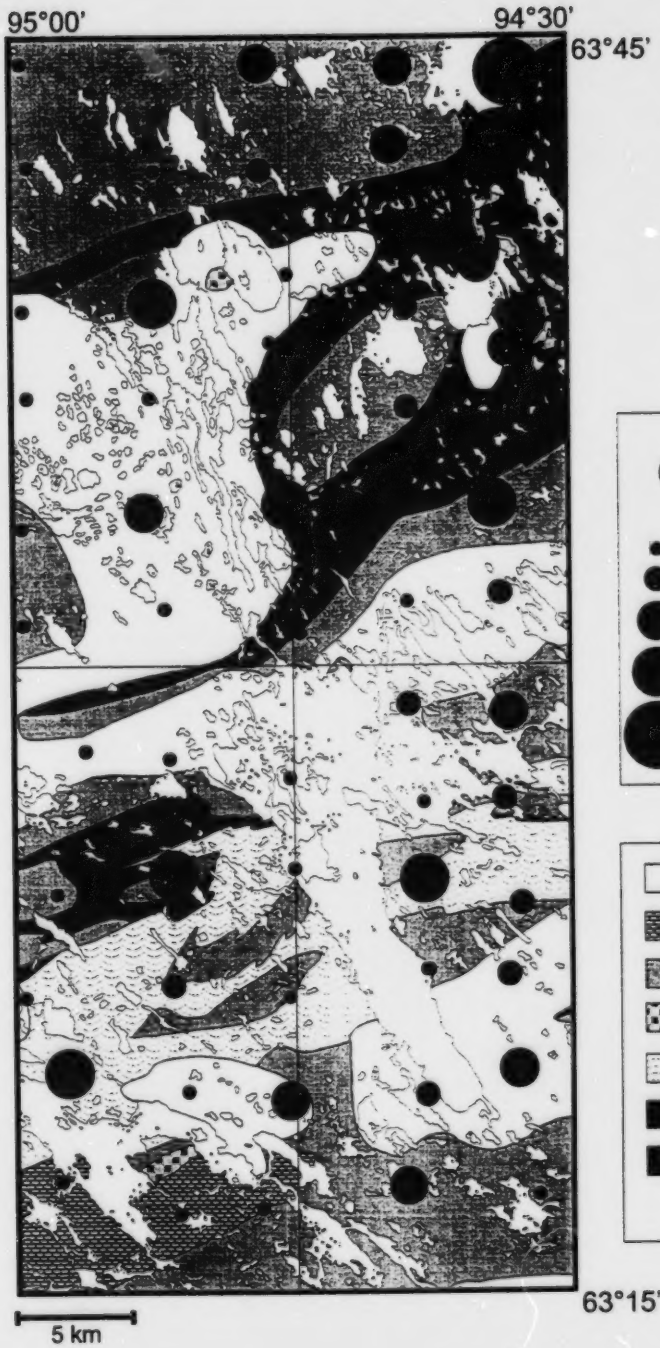
Generalized from Tella *et al.*, 1997b

Ca		
Till Geochemistry < 0.002 mm	Sample Preparation: Analytical Preparation: Analytical Method: Detection Limit:	Centrifuge & Decantation Nitric-aqua regia partial leach ICP-AES 0.01%

Descriptive Statistics	
Mean	0.31
Standard Error	0.01
Median	0.31
Mode	0.35
Standard Deviation	0.05
Sample Variance	0.00
Kurtosis	0.00
Skewness	0.06
Range	0.28
Minimum	0.18
Maximum	0.46
Sum	19.55
Count	63
Maximum	0.46
99th percentile	0.42
98th percentile	0.40
95th percentile	0.39
90th percentile	0.38
75th percentile	0.35
Median	0.31
25th percentile	0.27
5th percentile	0.23
Minimum	0.18







Ca

Calcium (%)

(<0.002 mm fraction)

Calcium (%)
(<0.002 mm fraction)

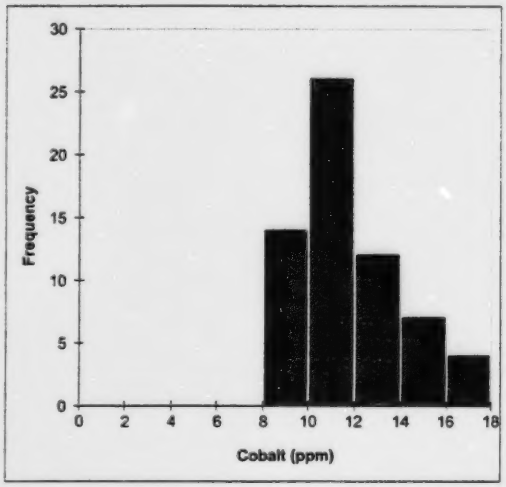
	Min	Max	%tile	# Samp
	0.18	0.31	50th	30
	0.31	0.35	75th	14
	0.35	0.38	90th	11
	0.38	0.4	98th	6
	0.4	0.46	100th	2

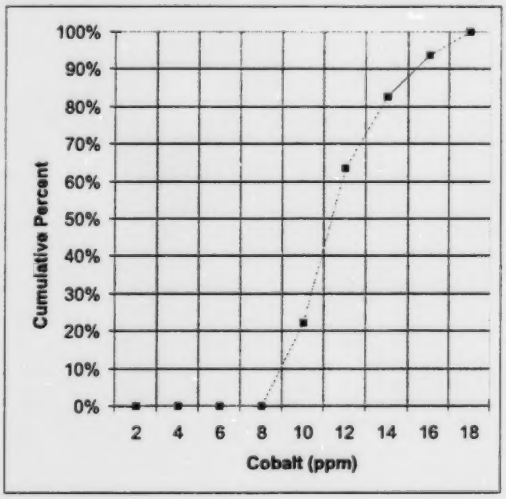
- Glacial Deposits
- Orthogneiss
- Granitoid Rocks; quartz diorite, granite
- Gabbro
- Metasedimentary Rocks
- Metavolcanic Rocks; basalt to andesite
- Metavolcanic Rocks; intermediate to felsic

Generalized from Tella *et al.*, 1997b

Co		
Till Geochemistry	Sample Preparation:	Centrifuge & Decantation
< 0.002 mm	Analytical Preparation:	Nitric-aqua regia partial leach
	Analytical Method:	ICP-AES
	Detection Limit:	1 ppm

Descriptive Statistics	
Mean	12.30
Standard Error	0.29
Median	12.00
Mode	11.00
Standard Deviation	2.27
Sample Variance	5.15
Kurtosis	-0.31
Skewness	0.64
Range	9.00
Minimum	9.00
Maximum	18.00
Sum	775.00
Count	63
Maximum	18.00
99th percentile	17.38
98th percentile	17.00
95th percentile	16.90
90th percentile	15.80
75th percentile	14.00
Median	12.00
25th percentile	11.00
5th percentile	9.00
Minimum	9.00

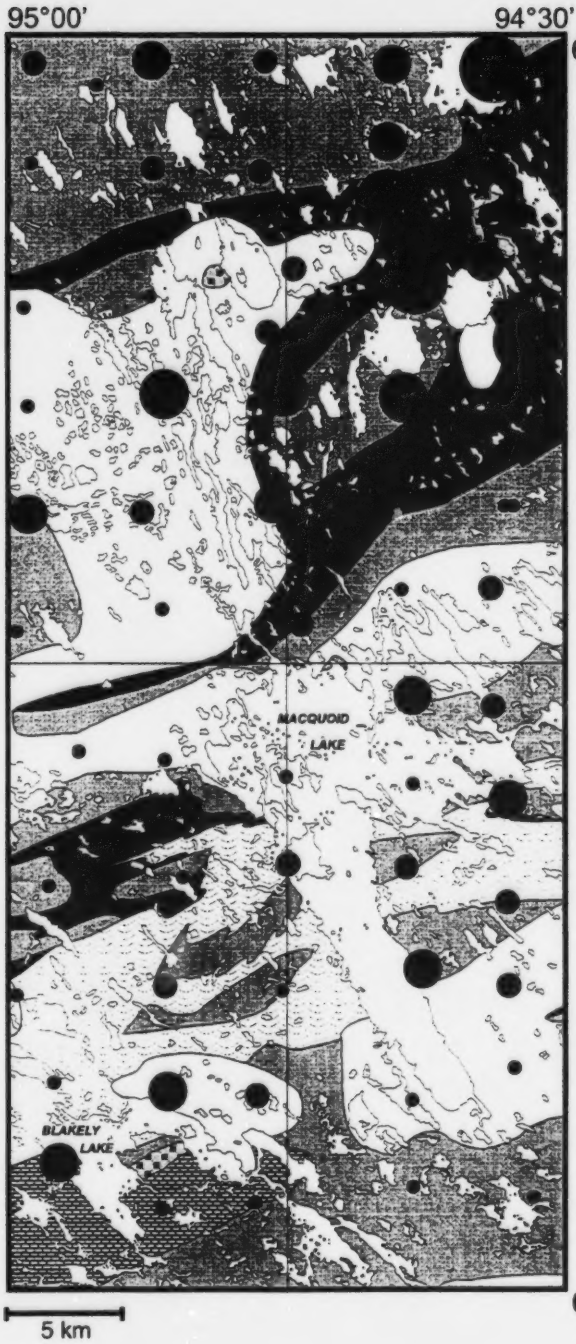




Co

Cobalt (ppm)

(<0.002 mm fraction)



Cobalt (ppm)
(<0.002 mm fraction)

	Min	Max	%tile	# Samp
●	9	12	50th	27
●	12	14	75th	17
●	14	15.8	90th	12
●	15.8	17	98th	3
●	17	18	100th	4

- Glacial Deposits
- Orthogneiss
- Granitoid Rocks; quartz diorite, granite
- Gabbro
- Metasedimentary Rocks
- Metavolcanic Rocks; basalt to andesite
- Metavolcanic Rocks; intermediate to felsic

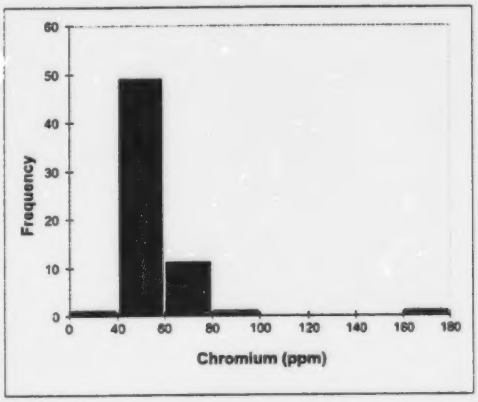
Generalized from Tella *et al.*, 1997b

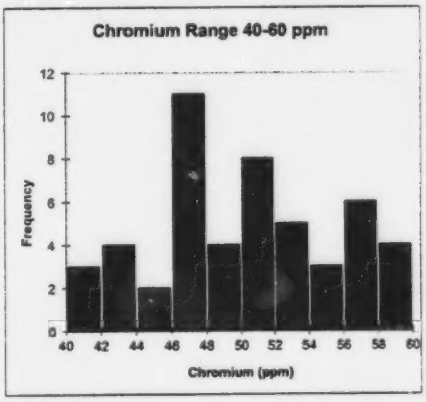
Cr	Sample Preparation:	Centrifuge & Decantation
Till Geochemistry	Analytical Preparation:	Nitric-aqua regia partial leach
< 0.002 mm	Analytical Method:	ICP-AES
	Detection Limit:	1 ppm

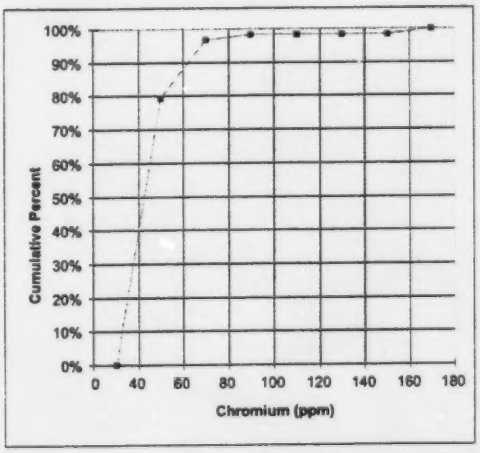
Descriptive Statistics

Mean	56.25
Standard Error	2.22
Median	52.00
Mode	48.00
Standard Deviation	17.62
Sample Variance	310.32
Kurtosis	32.57
Skewness	5.04
Range	133.00
Minimum	41.00
Maximum	174.00
Sum	3544.00
Count	63

Maximum	174.00
99th percentile	117.58
98th percentile	81.80
95th percentile	74.90
90th percentile	68.40
75th percentile	59.00
Median	52.00
25th percentile	48.00
5th percentile	43.10
Minimum	41.00



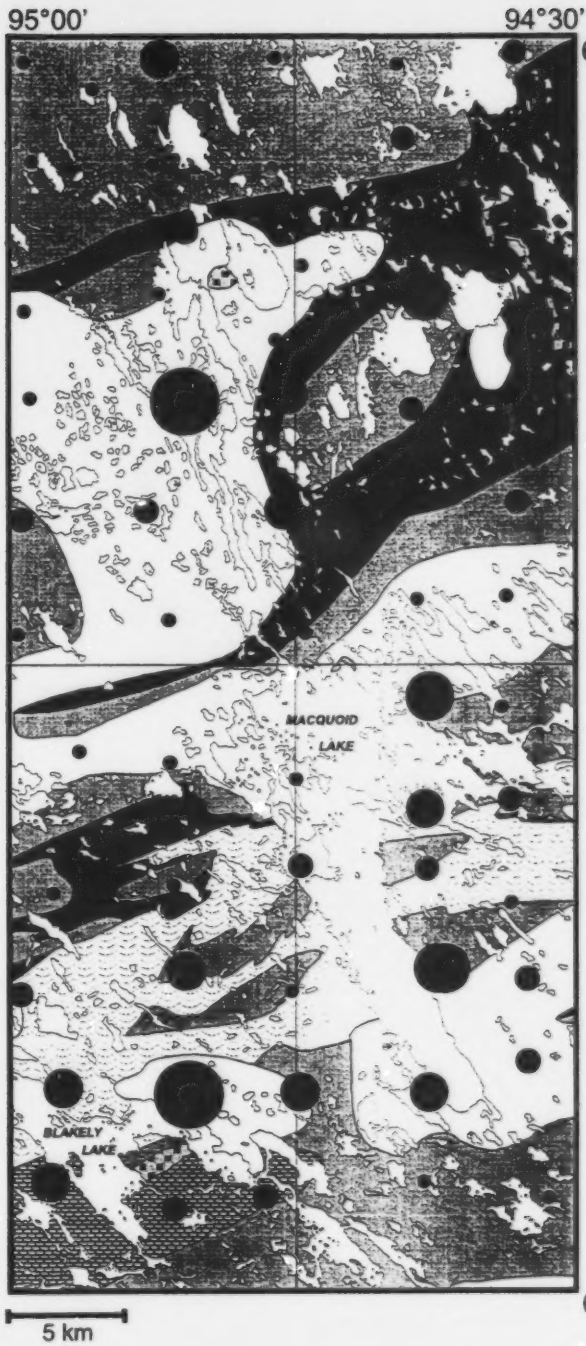




Cr

Chromium (ppm)

(<0.002 mm fraction)



Chromium (ppm) (<0.002 mm fraction)

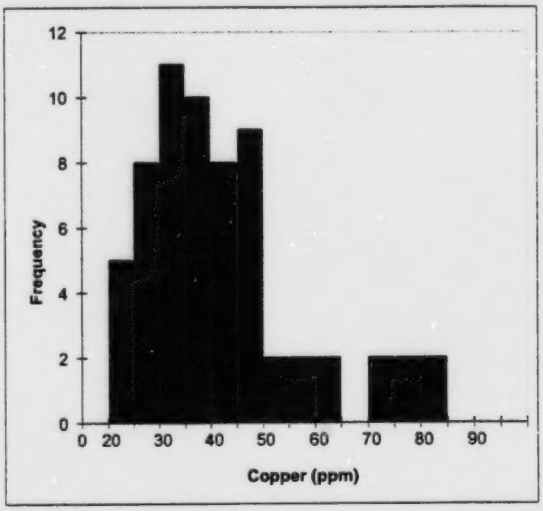
	Min	Max	%tile	# Samp
●	41	52	50th	30
●	52	59	75th	16
●	59	68.4	90th	10
●	68.4	81.8	98th	5
●	81.8	174	100th	2

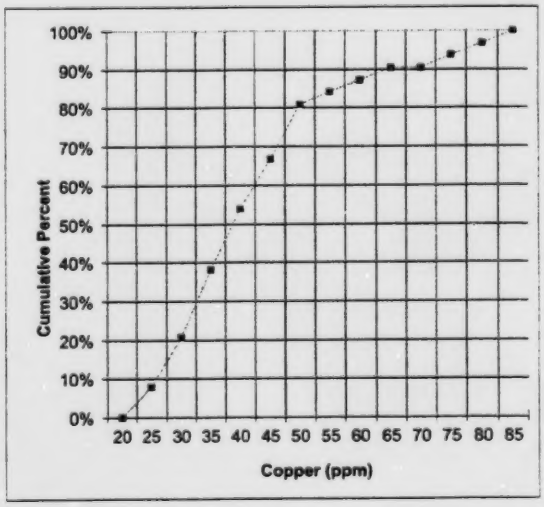
- Glacial Deposits
- Orthogneiss
- Granitoid Rocks; quartz diorite, granite
- Gabbro
- Metasedimentary Rocks
- Metavolcanic Rocks; basalt to andesite
- Metavolcanic Rocks; intermediate to felsic

Generalized from Tella *et al.*, 1997b

Cu		
Till Geochemistry	Sample Preparation:	Centrifuge & Decantation
< 0.002 mm	Analytical Preparation:	Nitric-aqua regia partial leach
	Analytical Method:	ICP-AES
	Detection Limit:	1 ppm

Descriptive Statistics	
Mean	42.67
Standard Error	1.91
Median	39.00
Mode	39.00
Standard Deviation	15.18
Sample Variance	230.52
Kurtosis	1.04
Skewness	1.19
Range	62.00
Minimum	22.00
Maximum	84.00
Sum	2688.00
Count	63
Maximum	84.00
99th percentile	84.00
98th percentile	82.80
95th percentile	76.70
90th percentile	64.80
75th percentile	47.50
Median	39.00
25th percentile	32.50
5th percentile	24.10
Minimum	22.00

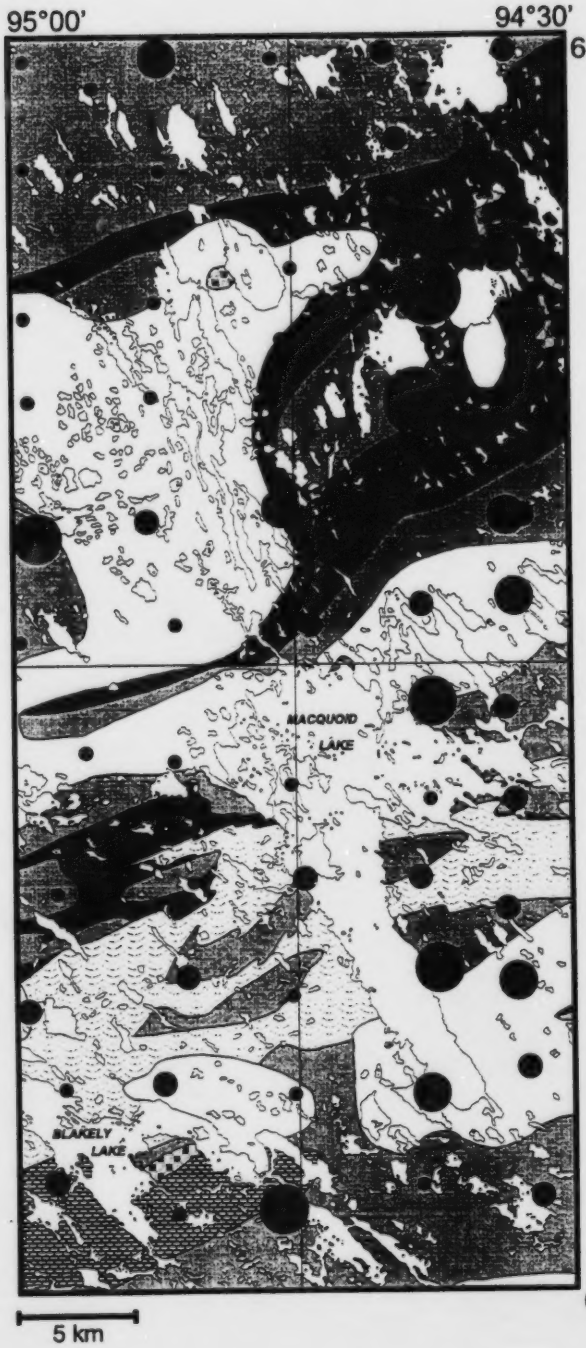




Cu

Copper (ppm)

(<0.002 mm fraction)



Copper (ppm)
(<0.002 mm fraction)

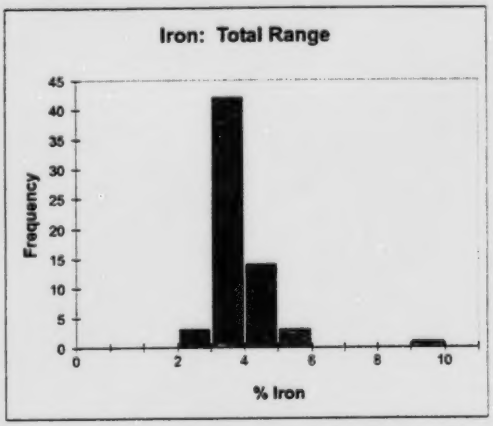
	Min	Max	%tile	# Samp
●	22	39	50th	28
●	39	47.5	75th	19
●	47.5	64.8	90th	9
●	64.8	82.8	98th	5
●	82.8	84	100th	2

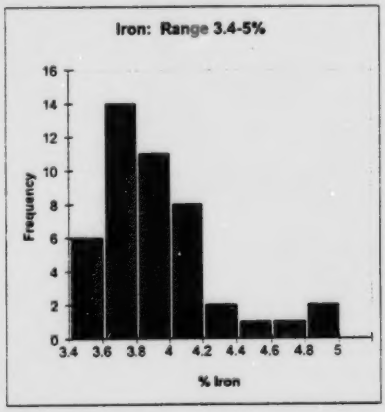
- Glacial Deposits
- Orthogneiss
- Granitoid Rocks; quartz diorite, granite
- Gabbro
- Metasedimentary Rocks
- Metavolcanic Rocks; basalt to andesite
- Metavolcanic Rocks; intermediate to felsic

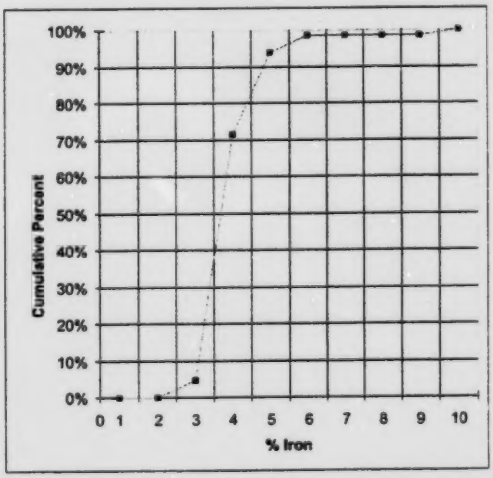
Generalized from Tella *et al.*, 1997b

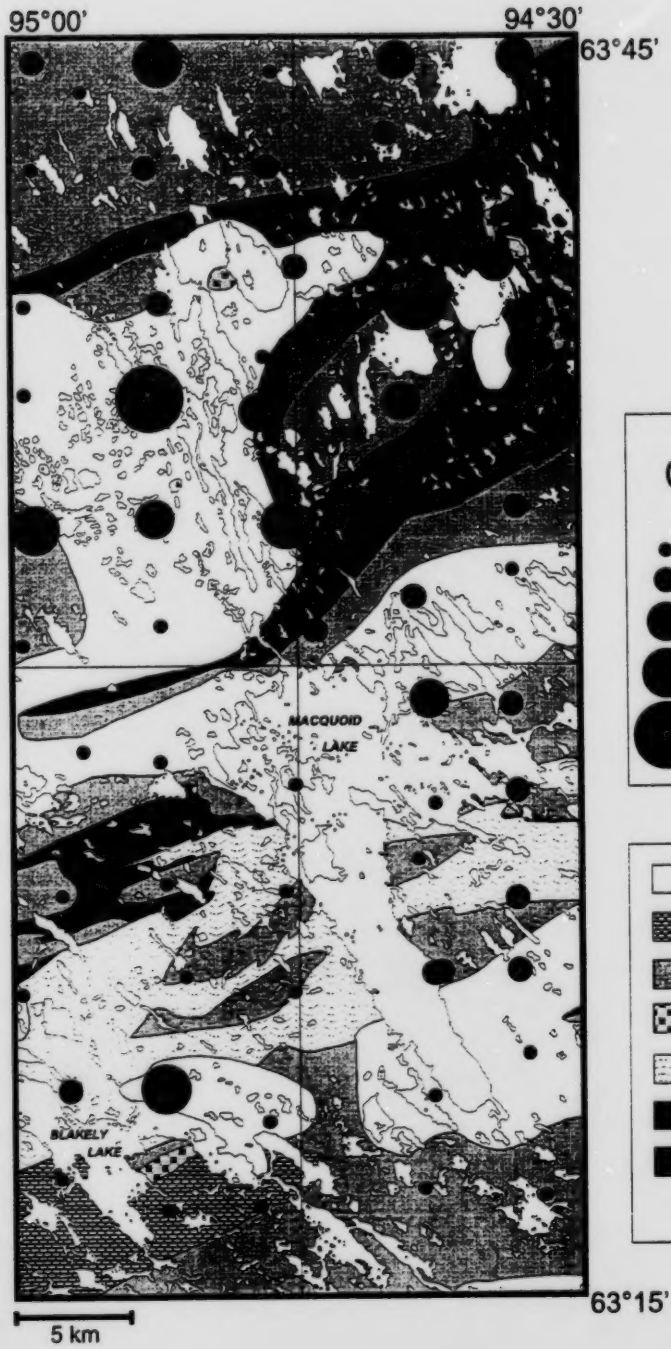
Fe		
Till Geochemistry	Sample Preparation:	Centrifuge & Decantation
< 0.002 mm	Analytical Preparation:	Nitric-aqua regia partial leach
	Analytical Method:	ICP-AES
	Detection Limit:	0.01%

Descriptive Statistics	
Mean	3.91
Standard Error	0.12
Median	3.78
Mode	3.81
Standard Deviation	0.96
Sample Variance	0.92
Kurtosis	26.32
Skewness	4.33
Range	7.32
Minimum	2.67
Maximum	9.99
Sum	246.19
Count	63
Maximum	9.99
99th percentile	7.18
98th percentile	5.38
95th percentile	5.11
90th percentile	4.66
75th percentile	4.03
Median	3.78
25th percentile	3.48
5th percentile	3.01
Minimum	2.67









Fe

Iron (%)

(<0.002 mm fraction)

Iron (%) (<0.002 mm fraction)

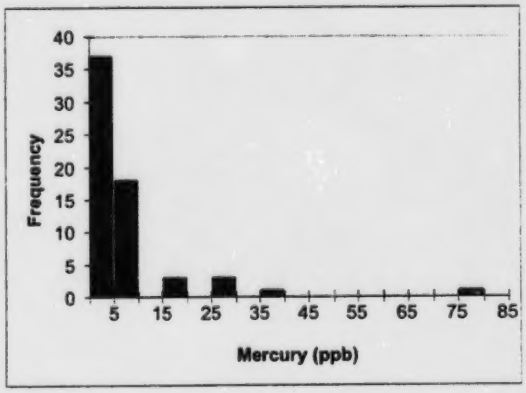
Min	Max	%tile	# Samp
2.67	3.78	50th	31
3.78	4.03	75th	16
4.03	4.66	90th	9
4.66	5.38	98th	5
5.38	9.99	100th	2

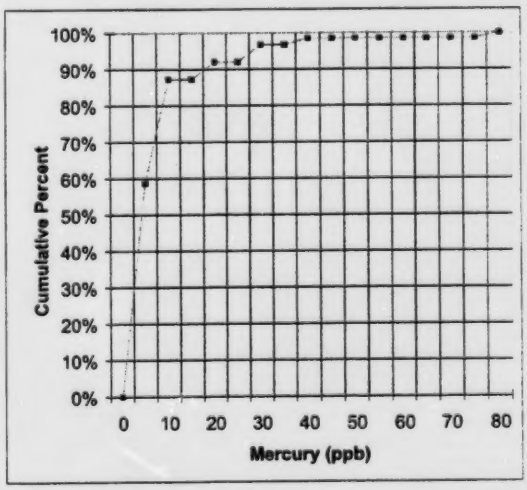
- Glacial Deposits
- Orthogneiss
- Granitoid Rocks; quartz diorite, granite
- Gabbro
- Metasedimentary Rocks
- Metavolcanic Rocks; basalt to andesite
- Metavolcanic Rocks; intermediate to felsic

Generalized from Tella *et al.*, 1997b

Hg		
Till Geochemistry	Sample Preparation:	Centrifuge & Decantation
< 0.002 mm	Analytical Preparation:	Nitric-aqua regia partial leach
	Analytical Method:	AAS-Cold Vapour
	Detection Limit:	10 ppb

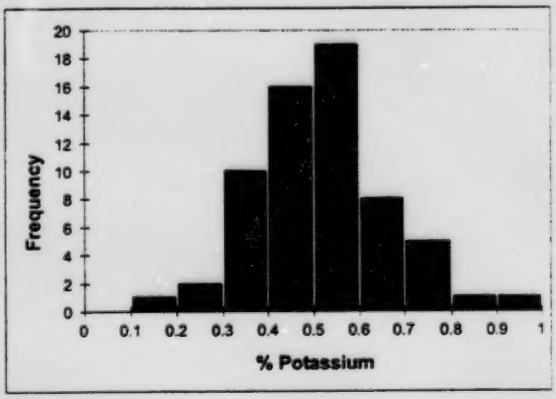
Descriptive Statistics	
Mean	10.08
Standard Error	1.45
Median	5.00
Mode	5.00
Standard Deviation	11.52
Sample Variance	132.65
Kurtosis	22.32
Skewness	4.26
Range	75.00
Minimum	5.00
Maximum	80.00
Sum	635.00
Count	63
Maximum	80.00
99th percentile	55.20
98th percentile	37.60
95th percentile	30.00
90th percentile	20.00
75th percentile	10.00
Median	5.00
25th percentile	5.00
5th percentile	5.00
Minimum	5.00

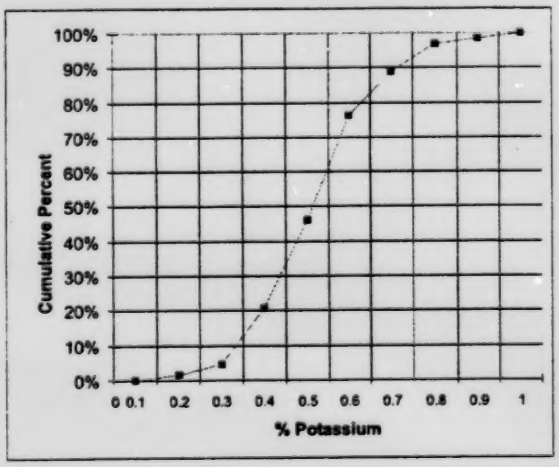


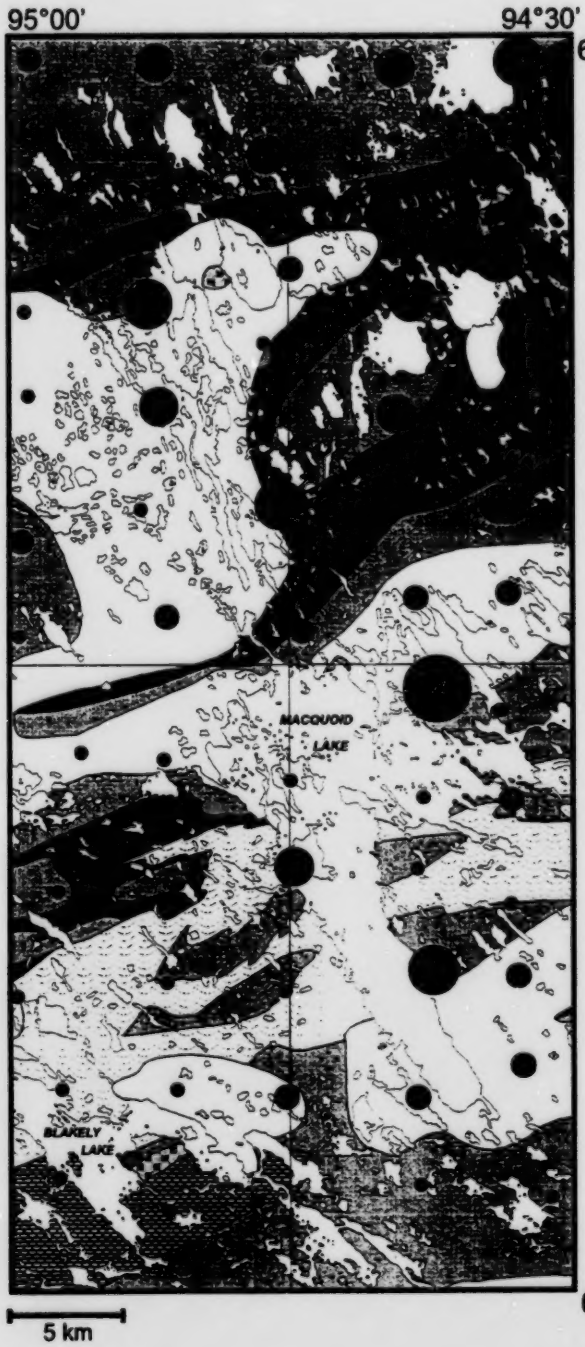


K		
Till Geochemistry < 0.002 mm	Sample Preparation: Analytical Preparation: Analytical Method: Detection Limit:	Centrifuge & Decantation Nitric-aqua regia partial leach ICP-AES 0.01%

Descriptive Statistics	
Mean	0.53
Standard Error	0.02
Median	0.52
Mode	0.39
Standard Deviation	0.15
Sample Variance	0.02
Kurtosis	0.99
Skewness	0.30
Range	0.84
Minimum	0.12
Maximum	0.96
Sum	33.20
Count	63
Maximum	0.96
99th percentile	0.90
98th percentile	0.84
95th percentile	0.77
90th percentile	0.71
75th percentile	0.60
Median	0.52
25th percentile	0.44
5th percentile	0.31
Minimum	0.12







K

Potassium (%)

(<0.002 mm fraction)

Potassium (%) (<0.002 mm fraction)

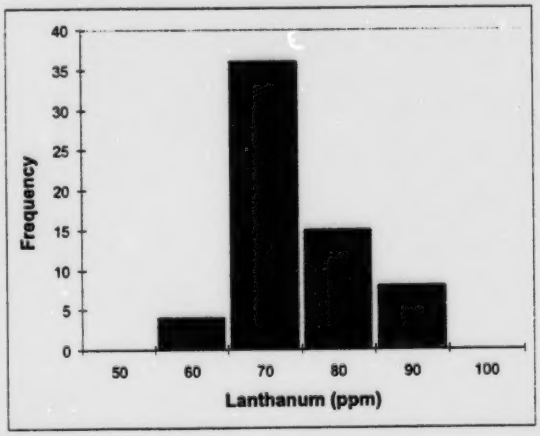
	Min	Max	%tile	# Samp
	0.12	0.52	50th	31
	0.52	0.6	75th	14
	0.6	0.71	90th	11
	0.71	0.84	98th	5
	0.84	0.96	100th	2

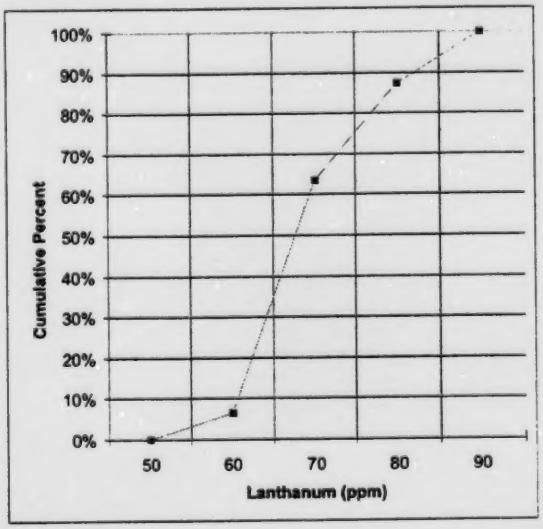
- Glacial Deposits
- Orthogneiss
- Granitoid Rocks; quartz diorite, granite
- Gabbro
- Metasedimentary Rocks
- Metavolcanic Rocks; basalt to andesite
- Metavolcanic Rocks; intermediate to felsic

Generalized from Tella *et al.*, 1997b

La		
Till Geochemistry < 0.002 mm	Sample Preparation: Analytical Preparation: Analytical Method: Detection Limit:	Centrifuge & Decantation Nitric-aqua regia partial leach ICP-AES 10 ppm

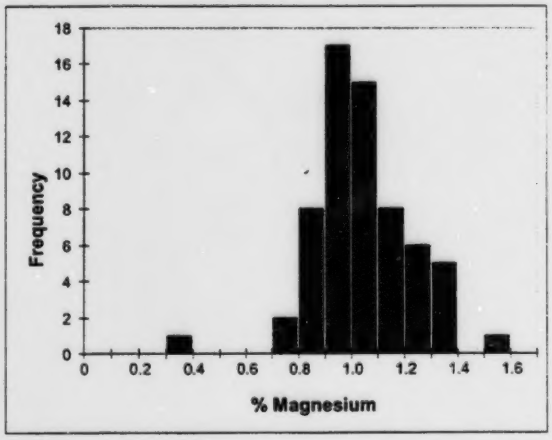
Descriptive Statistics	
Mean	74.29
Standard Error	1.00
Median	70.00
Mode	70.00
Standard Deviation	7.97
Sample Variance	63.59
Kurtosis	-0.15
Skewness	0.64
Range	30.00
Minimum	60.00
Maximum	90.00
Sum	4680.00
Count	63
Maximum	90.00
99th percentile	90.00
98th percentile	90.00
95th percentile	90.00
90th percentile	90.00
75th percentile	80.00
Median	70.00
25th percentile	70.00
5th percentile	61.00
Minimum	60.00

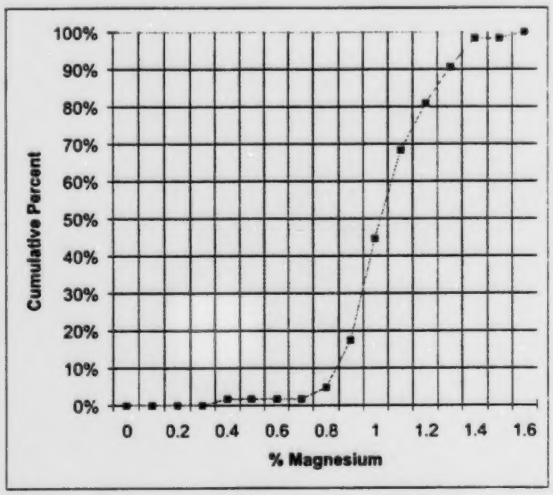


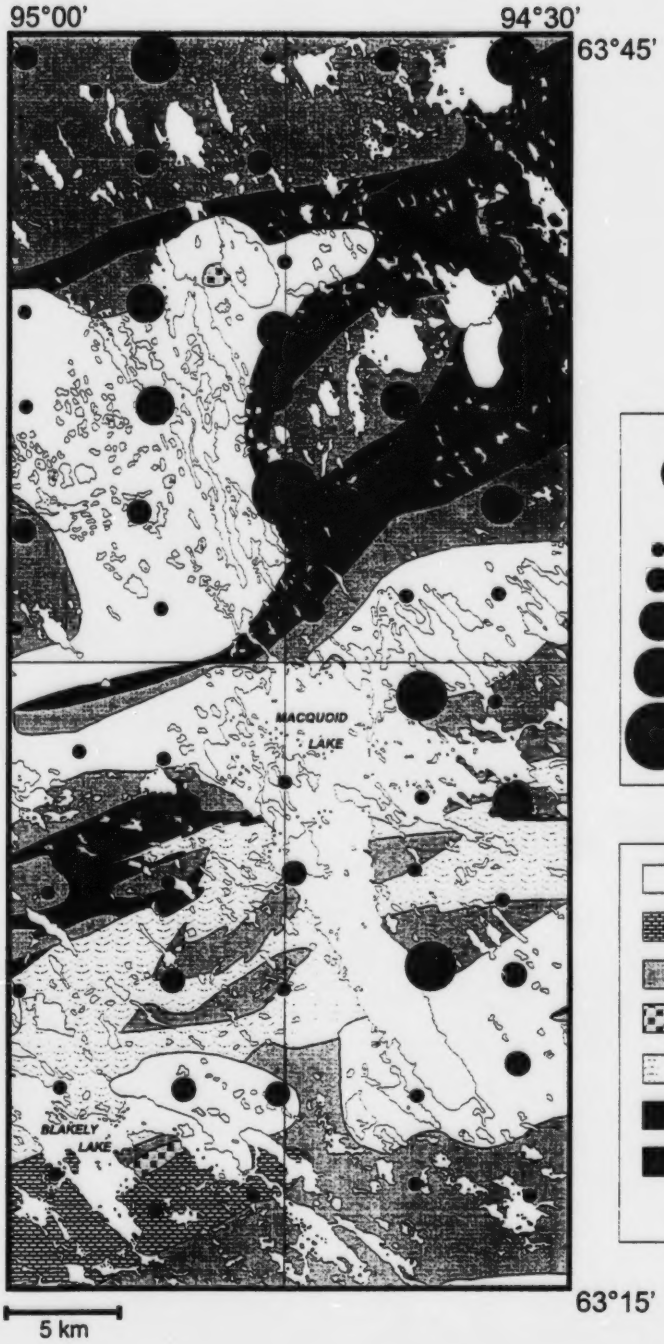


Mg Till Geochemistry < 0.002 mm	Sample Preparation: Analytical Preparation: Analytical Method: Detection Limit:	Centrifuge & Decantation Nitric-aqua regia partial leach ICP-AES 0.01%

Descriptive Statistics	
Mean	1.04
Standard Error	0.02
Median	1.02
Mode	0.97
Standard Deviation	0.18
Sample Variance	0.03
Kurtosis	2.42
Skewness	-0.24
Range	1.17
Minimum	0.38
Maximum	1.55
Sum	65.74
Count	63
Maximum	1.55
99th percentile	1.44
98th percentile	1.36
95th percentile	1.33
90th percentile	1.29
75th percentile	1.14
Median	1.02
25th percentile	0.95
5th percentile	0.82
Minimum	0.38







Mg

Magnesium (%)

(<0.002 mm fraction)

Magnesium (%)
(<0.002 mm fraction)

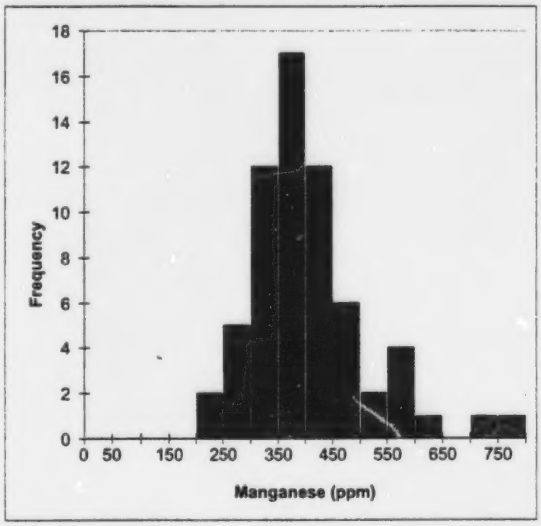
	Min	Max	%tile	# Samp
	0.38	1.02	50th	31
	1.02	1.14	75th	16
	1.14	1.29	90th	9
	1.29	1.36	98th	5
	1.36	1.55	100th	2

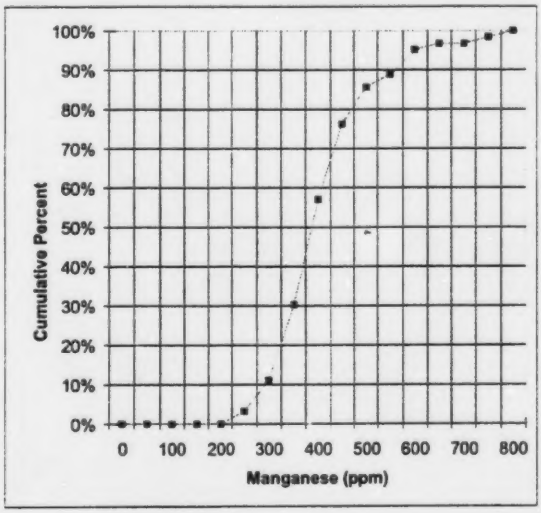
- Glacial Deposits
- Orthogneiss
- Granitoid Rocks; quartz diorite, granite
- Gabbro
- Metasedimentary Rocks
- Metavolcanic Rocks; basalt to andesite
- Metavolcanic Rocks; intermediate to felsic

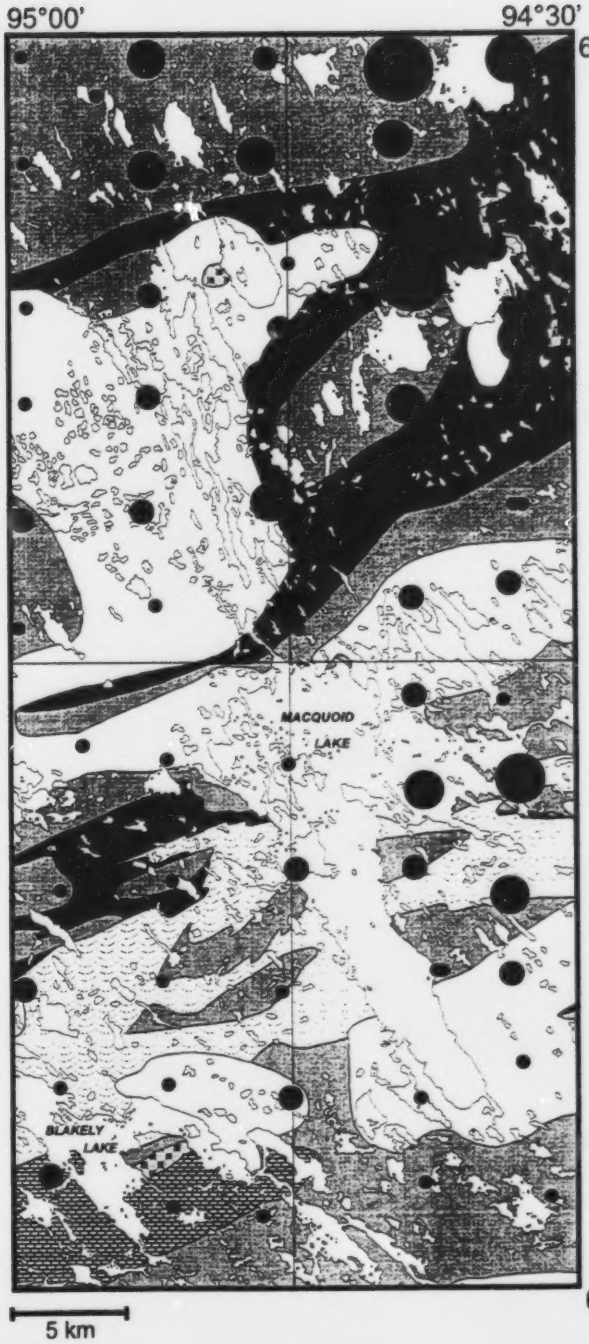
Generalized from Tella *et al.*, 1997b

Mn		
Till Geochemistry	Sample Preparation:	Centrifuge & Decantation
< 0.002 mm	Analytical Preparation:	Nitric-aqua regia partial leach
	Analytical Method:	ICP-AES
	Detection Limit:	5 ppm

Descriptive Statistics	
Mean	407.86
Standard Error	13.59
Median	380.00
Mode	370.00
Standard Deviation	107.87
Sample Variance	11636.87
Kurtosis	2.62
Skewness	1.38
Range	560.00
Minimum	230.00
Maximum	790.00
Sum	25695.00
Count	63
Maximum	790.00
99th percentile	765.20
98th percentile	717.60
95th percentile	584.00
90th percentile	558.00
75th percentile	447.50
Median	380.00
25th percentile	340.00
5th percentile	290.00
Minimum	230.00







Mn

Manganese (ppm)

(<0.002 mm fraction)

Manganese (ppm)
(<0.002 mm fraction)

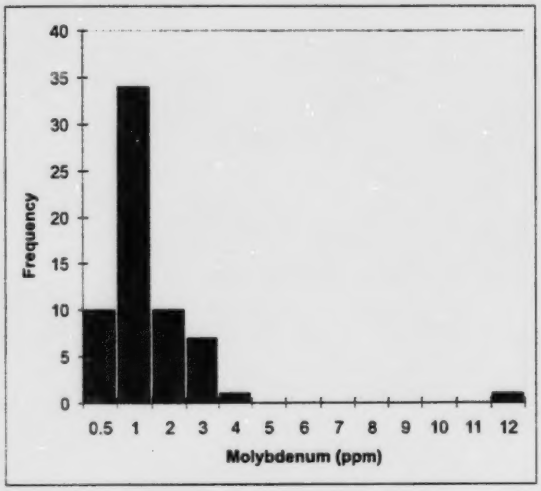
	Min	Max	%tile	# Samp
●	230	380	50th	31
●	380	448	75th	16
●	448	558	90th	9
●	558	718	98th	5
●	718	790	100th	2

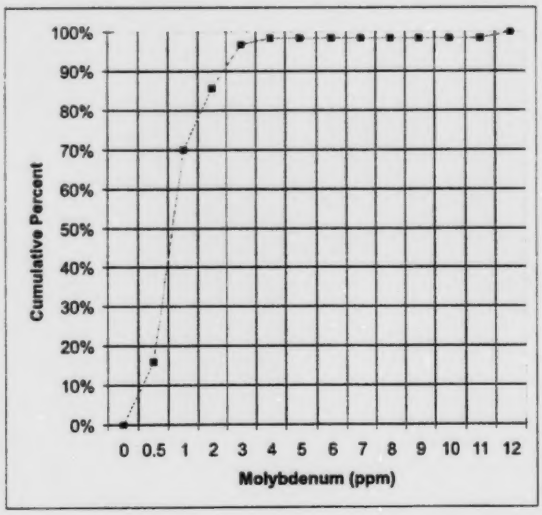
- Glacial Deposits
- Orthogneiss
- Granitoid Rocks; quartz diorite, granite
- Gabbro
- Metasedimentary Rocks
- Metavolcanic Rocks; basalt to andesite
- Metavolcanic Rocks; intermediate to felsic

Generalized from Tella *et al.*, 1997b

Mo		
Till Geochemistry < 0.002 mm	Sample Preparation: Analytical Preparation: Analytical Method: Detection Limit:	Centrifuge & Decantation Nitric-aqua regia partial leach ICP-AES 1 ppm

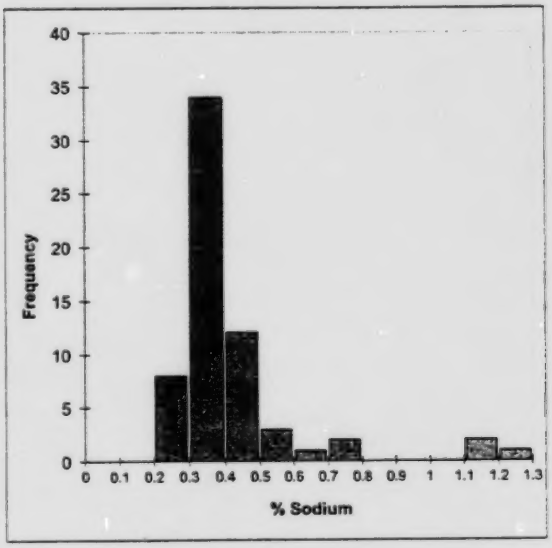
Descriptive Statistics	
Mean	1.52
Standard Error	0.20
Median	1.00
Mode	1.00
Standard Deviation	1.57
Sample Variance	2.47
Kurtosis	32.14
Skewness	5.03
Range	11.50
Minimum	0.50
Maximum	12.00
Sum	96.00
Count	63
Maximum	12.00
99th percentile	7.04
98th percentile	3.76
95th percentile	3.00
90th percentile	3.00
75th percentile	2.00
Median	1.00
25th percentile	1.00
5th percentile	0.50
Minimum	0.50

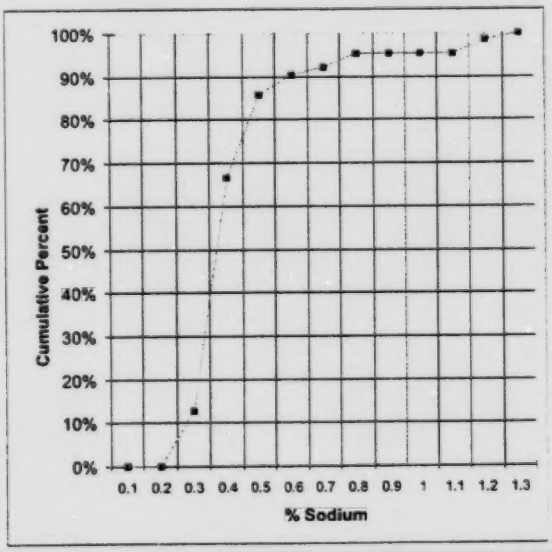


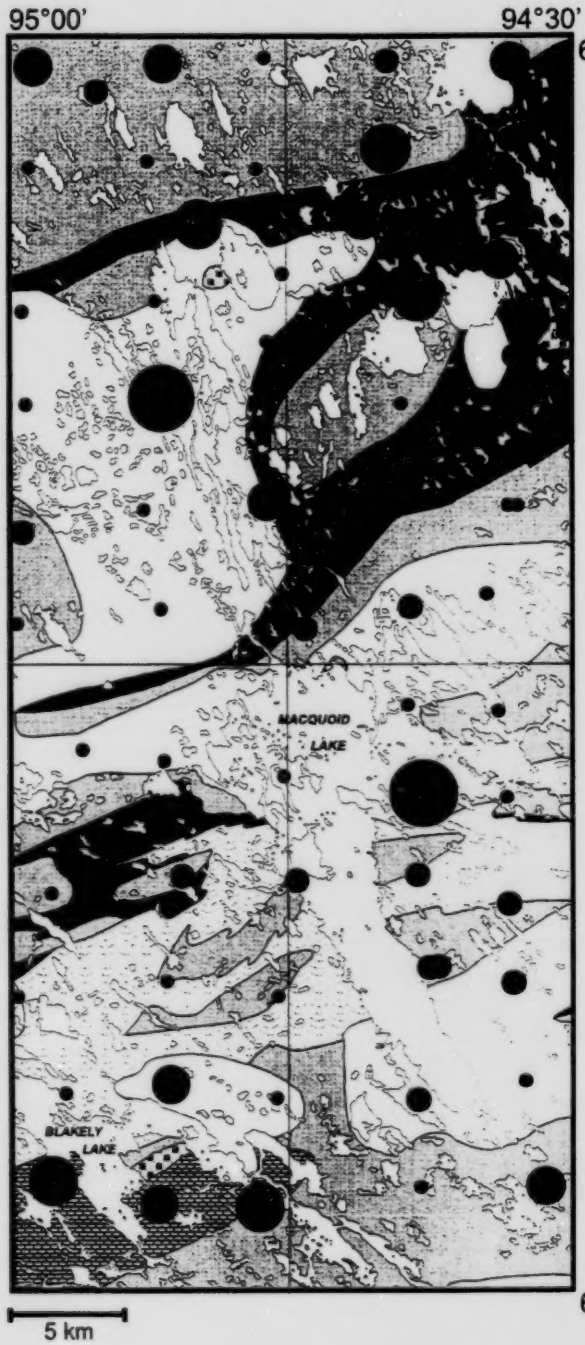


Na		
Till Geochemistry	Sample Preparation:	Centrifuge & Decantation
< 0.002 mm	Analytical Preparation:	Nitric-aqua regia partial leach
	Analytical Method:	ICP-AES
	Detection Limit:	0.01%

Descriptive Statistics	
Mean	0.43
Standard Error	0.02
Median	0.38
Mode	0.35
Standard Deviation	0.20
Sample Variance	0.04
Kurtosis	9.29
Skewness	3.00
Range	0.97
Minimum	0.26
Maximum	1.23
Sum	27.00
Count	63
Maximum	1.23
99th percentile	1.21
98th percentile	1.18
95th percentile	0.77
90th percentile	0.54
75th percentile	0.44
Median	0.38
25th percentile	0.34
5th percentile	0.29
Minimum	0.26







Na

Sodium (%)

(<0.002 mm fraction)

Sodium (%)
(<0.002 mm fraction)

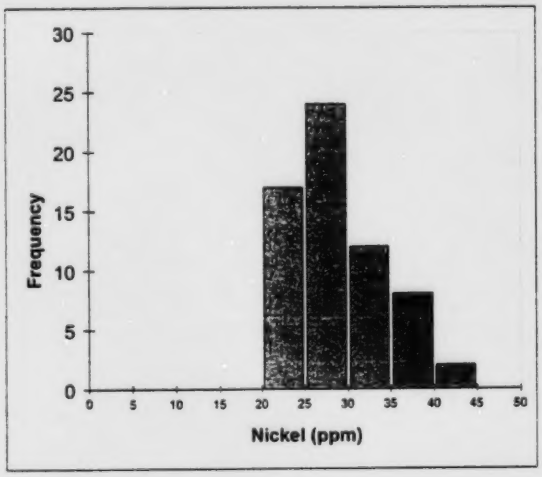
	Min	Max	%tile	# Samp
	0.26	0.38	50th	31
	0.38	0.44	75th	16
	0.44	0.54	90th	9
	0.54	1.18	98th	5
	1.18	1.23	100th	2

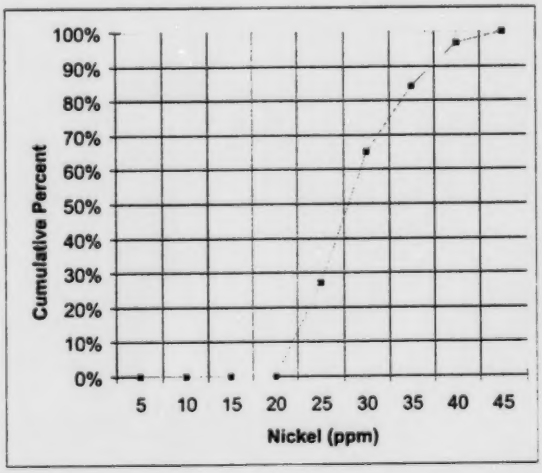
- Glacial Deposits
- Orthogneiss
- Granitoid Rocks; quartz diorite, granite
- Gabbro
- Metasedimentary Rocks
- Metavolcanic Rocks; basalt to andesite
- Metavolcanic Rocks; intermediate to felsic

Generalized from Tella *et al.*, 1997b

Ni		
Till Geochemistry	Sample Preparation:	Centrifuge & Decantation
< 0.002 mm	Analytical Preparation:	Nitric-aqua regia partial leach
	Analytical Method:	ICP-AES
	Detection Limit:	1 ppm

Descriptive Statistics	
Mean	29.11
Standard Error	0.67
Median	28.00
Mode	28.00
Standard Deviation	5.29
Sample Variance	27.97
Kurtosis	-0.06
Skewness	0.66
Range	22.00
Minimum	21.00
Maximum	43.00
Sum	1834.00
Count	63
Maximum	43.00
99th percentile	41.76
98th percentile	40.76
95th percentile	39.80
90th percentile	36.80
75th percentile	31.00
Median	28.00
25th percentile	25.00
5th percentile	22.00
Minimum	21.00

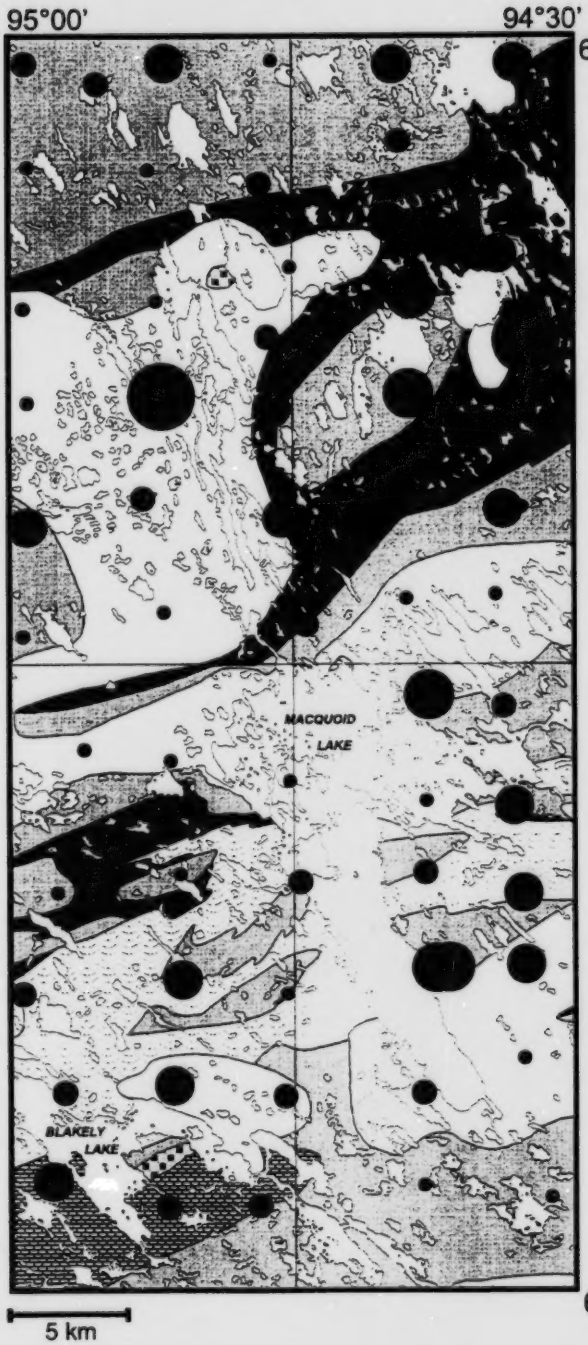




Ni

Nickel (ppm)

(<0.002 mm fraction)



Nickel (ppm) (<0.002 mm fraction)

	Min	Max	%tile	# Samp
	21	28	50th	24
	28	31	75th	17
	31	36.8	90th	15
	36.8	40.76	98th	5
	40.76	43	100th	2

- Glacial Deposits
- Orthogneiss
- Granitoid Rocks; quartz diorite, granite
- Gabbro
- Metasedimentary Rocks
- Metavolcanic Rocks; basalt to andesite
- Metavolcanic Rocks; intermediate to felsic

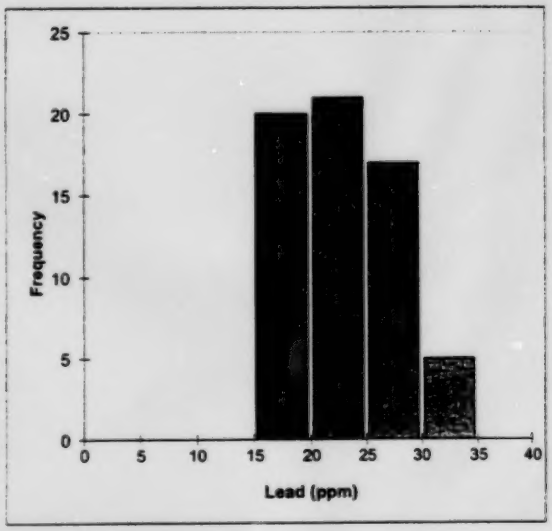
Generalized from Tella *et al.*, 1997b

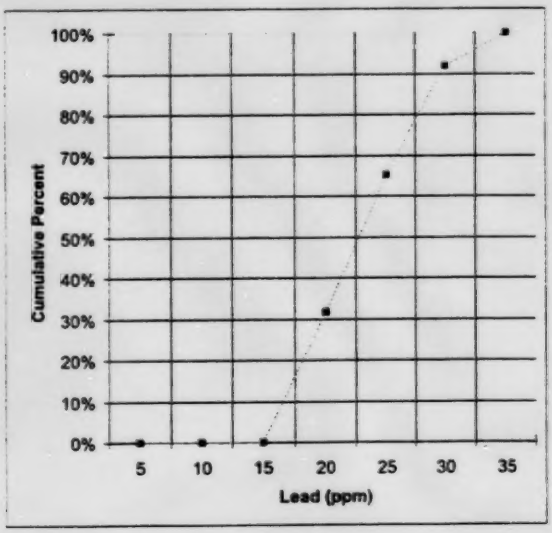
Pb

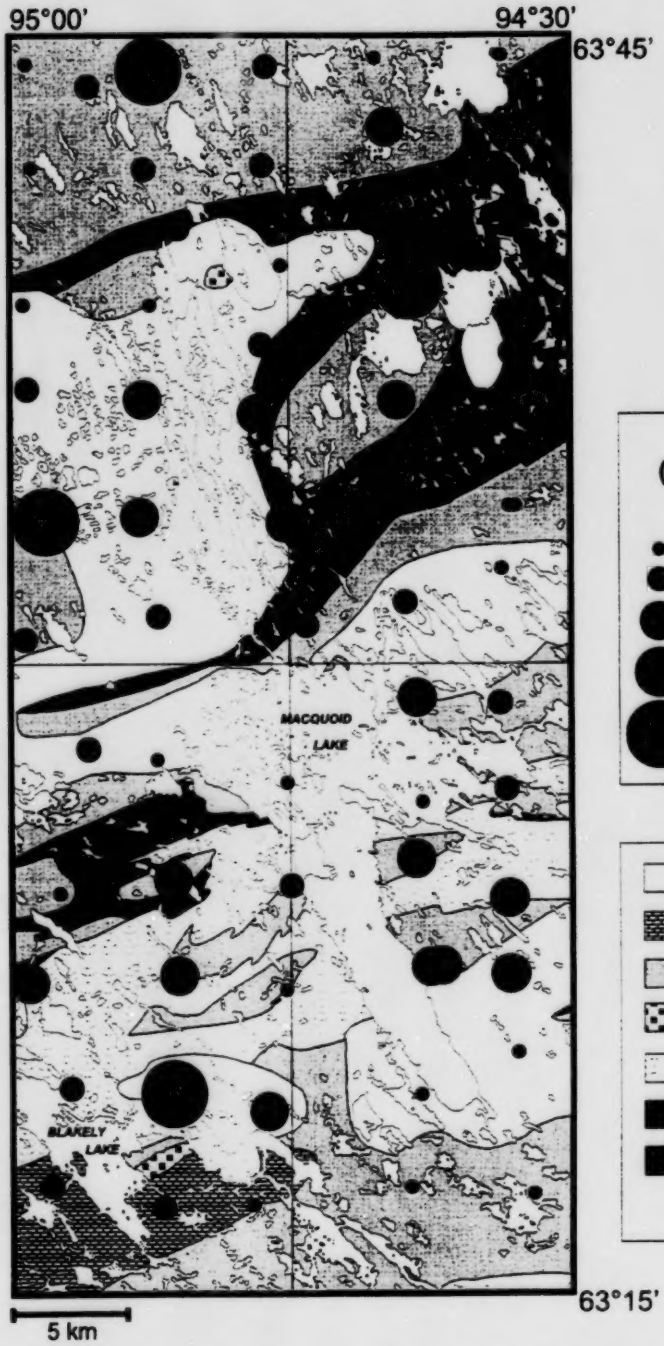
Till Geochemistry
< 0.002 mm

Sample Preparation:	Centrifuge & Decantation
Analytical Preparation:	Nitric-aqua regia partial leach
Analytical Method:	ICP-AES
Detection Limit:	2 ppm

Descriptive Statistics	
Mean	23.56
Standard Error	0.56
Median	22.00
Mode	22.00
Standard Deviation	4.42
Sample Variance	19.54
Kurtosis	0.14
Skewness	0.74
Range	18.00
Minimum	16.00
Maximum	34.00
Sum	1484.00
Count	63
Maximum	34.00
99th percentile	34.00
98th percentile	34.00
95th percentile	33.80
90th percentile	29.60
75th percentile	26.00
Median	22.00
25th percentile	20.00
5th percentile	18.00
Minimum	16.00







Pb

Lead (ppm)

(<0.002 mm fraction)

Lead (ppm) (<0.002 mm fraction)

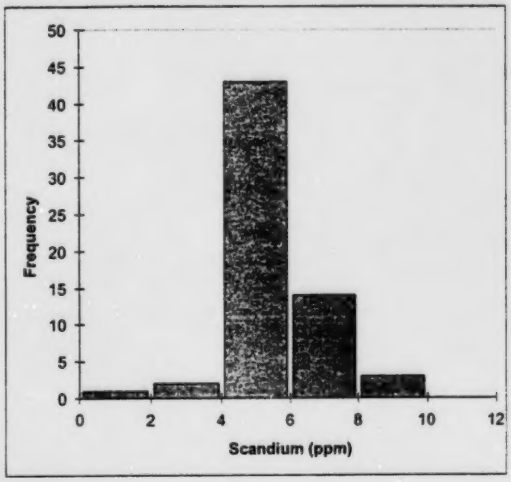
Min	Max	%tile	# Samp
16	22	50th	20
22	26	75th	21
26	29.6	90th	15
29.6	33.8	98th	3
33.8	34	100th	4

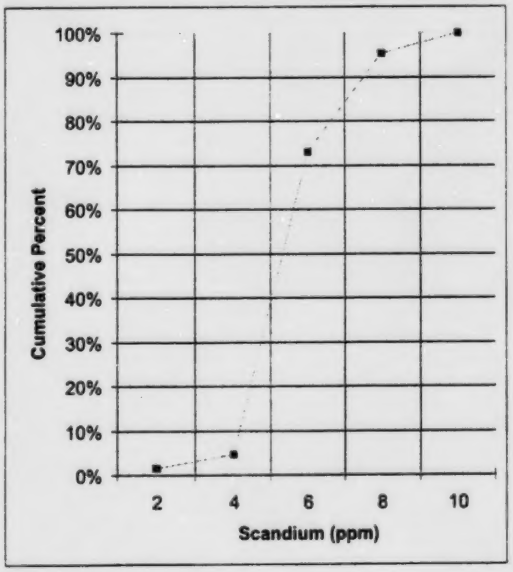
- Glacial Deposits
- Orthogneiss
- Granitoid Rocks; quartz diorite, granite
- Gabbro
- Metasedimentary Rocks
- Metavolcanic Rocks; basalt to andesite
- Metavolcanic Rocks; intermediate to felsic

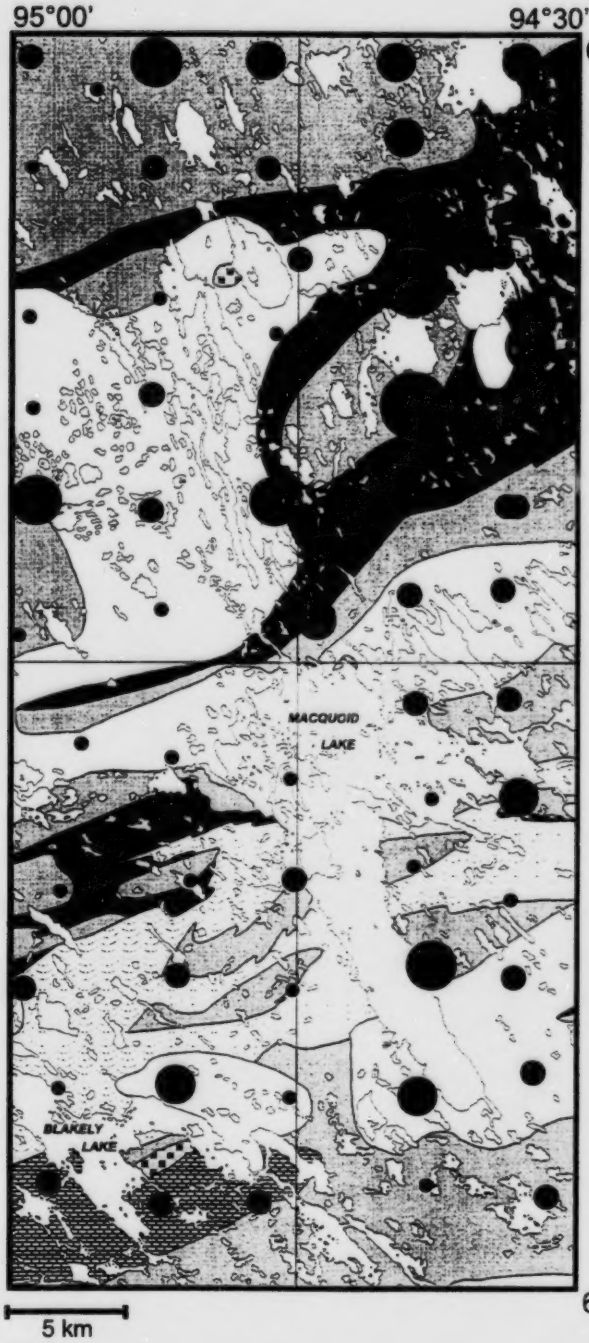
Generalized from Tella *et al.*, 1997b

Sc		
Till Geochemistry	Sample Preparation:	Centrifuge & Decantation
< 0.002 mm	Analytical Preparation:	Nitric-aqua regia partial leach
	Analytical Method:	ICP-AES
	Detection Limit:	1 ppm

Descriptive Statistics	
Mean	6.03
Standard Error	0.16
Median	6.00
Mode	6.00
Standard Deviation	1.31
Sample Variance	1.71
Kurtosis	1.75
Skewness	0.43
Range	8.00
Minimum	2.00
Maximum	10.00
Sum	380.00
Count	63
Maximum	10.00
99th percentile	9.38
98th percentile	9.00
95th percentile	8.00
90th percentile	8.00
75th percentile	7.00
Median	6.00
25th percentile	5.00
5th percentile	5.00
Minimum	2.00







Sc

Scandium (ppm)

(<0.002 mm fraction)

Scandium (ppm)
(<0.002 mm fraction)

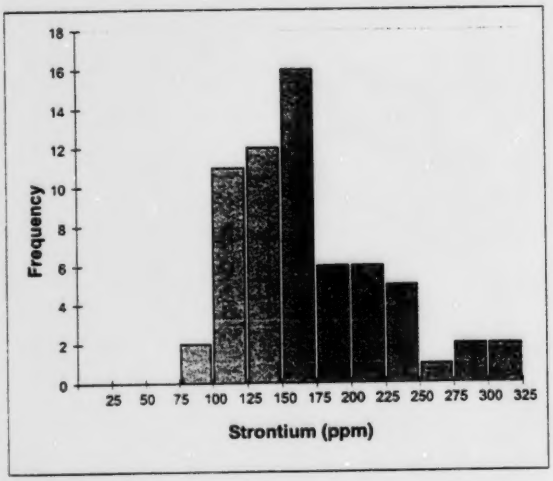
	Min	Max	%tile	# Samp
	2	6	50th	22
	6	7	75th	24
	7	8	90th	9
	8	9	98th	5
	9	10	100th	3

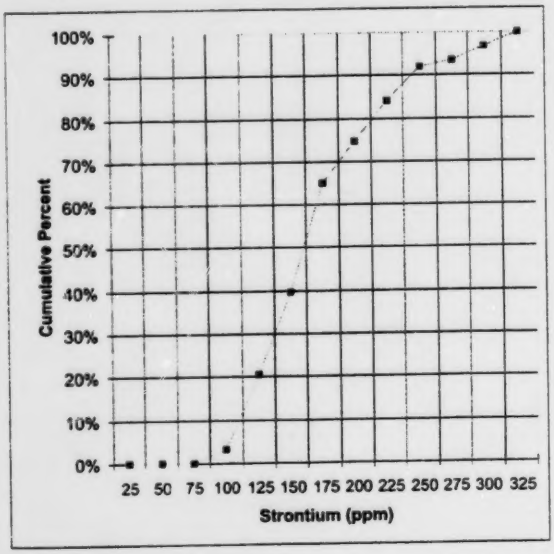
- Glacial Deposits
- Orthogneiss
- Granitoid Rocks; quartz diorite, granite
- Gabbro
- Metasedimentary Rocks
- Metavolcanic Rocks; basalt to andesite
- Metavolcanic Rocks; intermediate to felsic

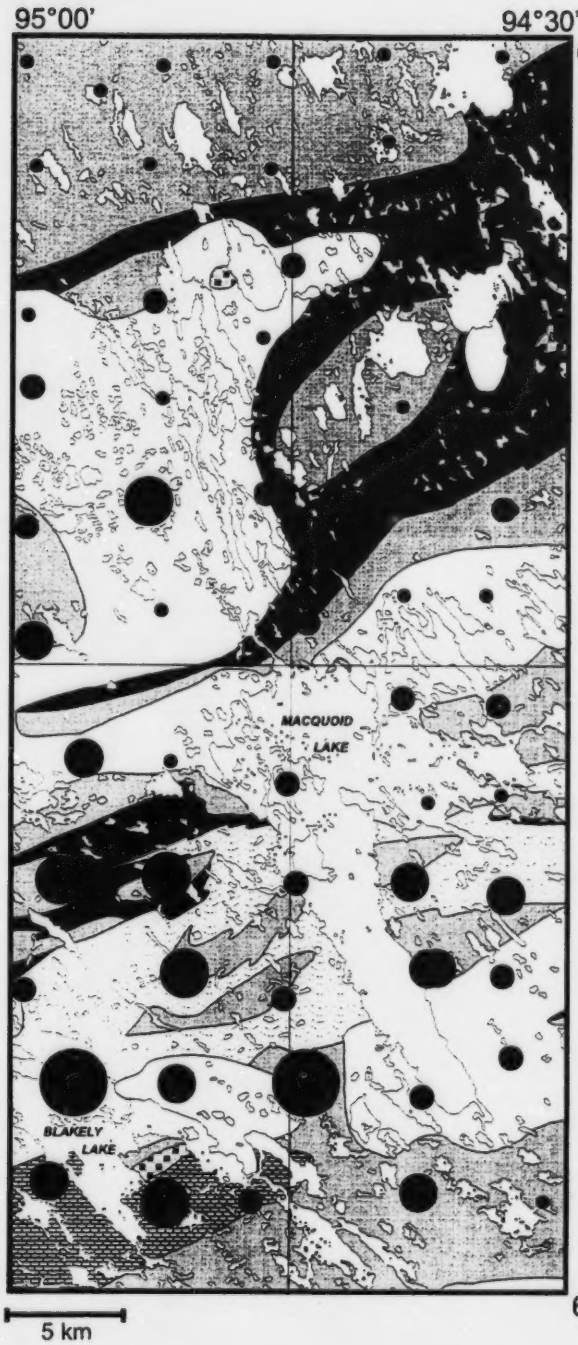
Generalized from Tella *et al.*, 1997b

Sr	Sample Preparation:	Centrifuge & Decantation
Till Geochemistry	Analytical Preparation:	Nitric-aqua regia partial leach
< 0.002 mm	Analytical Method:	ICP-AES
	Detection Limit:	1 ppm

Descriptive Statistics	
Mean	169.27
Standard Error	6.60
Median	160.00
Mode	161.00
Standard Deviation	52.37
Sample Variance	2742.85
Kurtosis	0.54
Skewness	0.90
Range	231.00
Minimum	82.00
Maximum	313.00
Sum	10664.00
Count	63
Maximum	313.00
99th percentile	306.80
98th percentile	300.12
95th percentile	286.60
90th percentile	233.60
75th percentile	200.00
Median	160.00
25th percentile	131.50
5th percentile	106.20
Minimum	82.00







Sr

Strontium (ppm)

(<0.002 mm fraction)

Strontium (ppm) (<0.002 mm fraction)

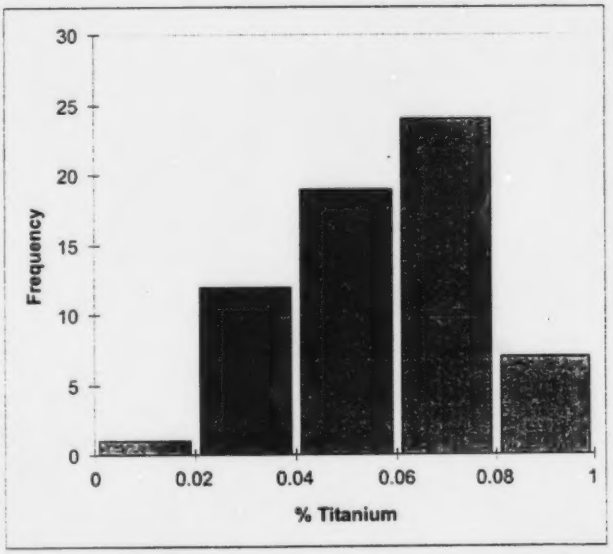
	Min	Max	%tile	# Samp
●	82	160	50th	30
●	160	200	75th	17
●	200	234	90th	9
●	234	300	98th	5
●	300	313	100th	2

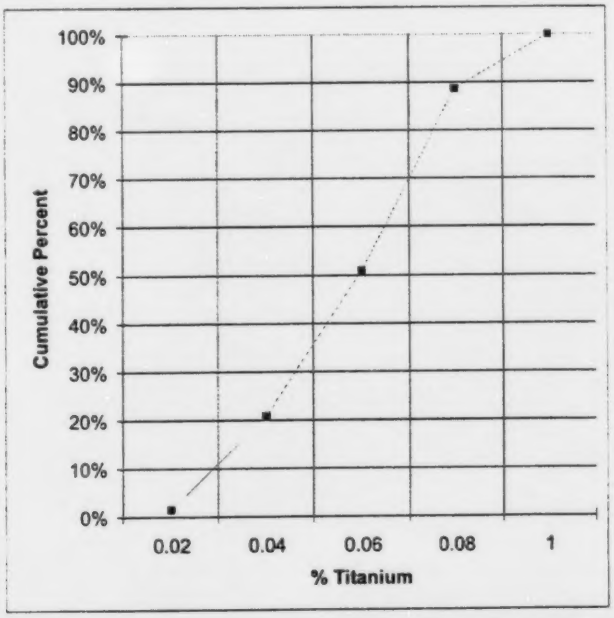
- Glacial Deposits
- Orthogneiss
- Granitoid Rocks; quartz diorite, granite
- Gabbro
- Metasedimentary Rocks
- Metavolcanic Rocks; basalt to andesite
- Metavolcanic Rocks; intermediate to felsic

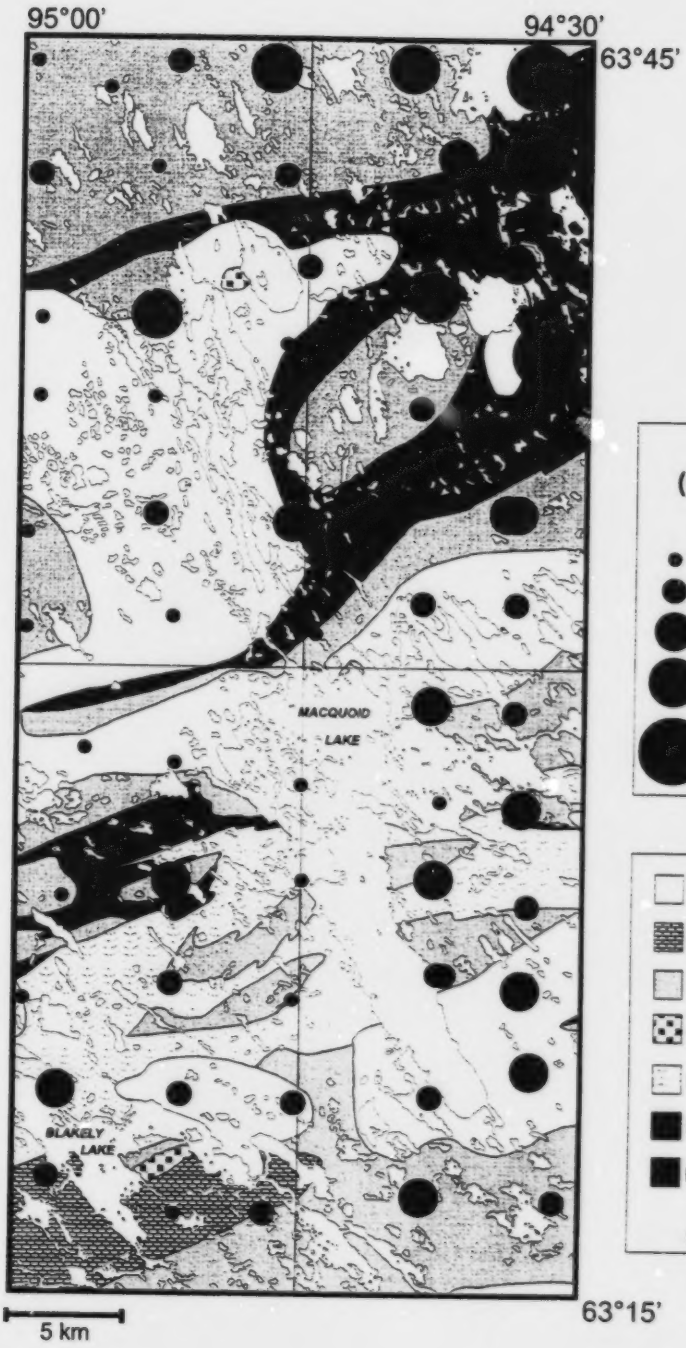
Generalized from Tella *et al.*, 1997b

Ti		
Till Geochemistry < 0.002 mm	Sample Preparation: Analytical Preparation: Analytical Method: Detection Limit:	Centrifuge & Decantation Nitric-aqua regia partial leach ICP-AES 0.01%

Descriptive Statistics	
Mean	0.06
Standard Error	0.00
Median	0.06
Mode	0.08
Standard Deviation	0.02
Sample Variance	0.00
Kurtosis	4.05
Skewness	1.04
Range	0.14
Minimum	0.02
Maximum	0.16
Sum	4.05
Count	63
Maximum	0.16
99th percentile	0.12
98th percentile	0.10
95th percentile	0.09
90th percentile	0.09
75th percentile	0.08
Median	0.06
25th percentile	0.05
5th percentile	0.03
Minimum	0.02







Ti

Titanium (%)

(<0.002 mm fraction)

Titanium (%)
(<0.002 mm fraction)

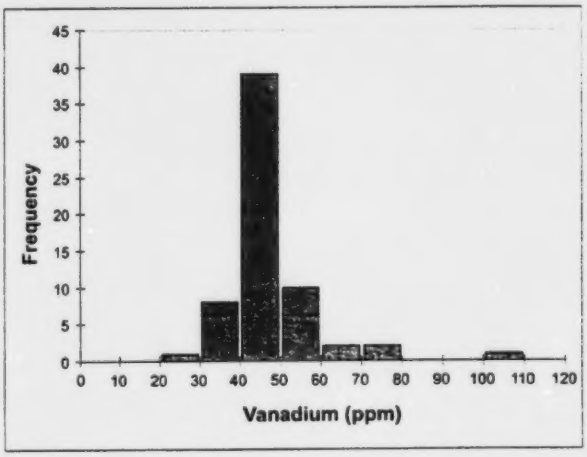
	Min	Max	%tile	# Samp
	0.02	0.06	50th	21
	0.06	0.08	75th	22
	0.08	0.09	90th	13
	0.09	0.1	98th	4
	0.1	0.16	100th	3

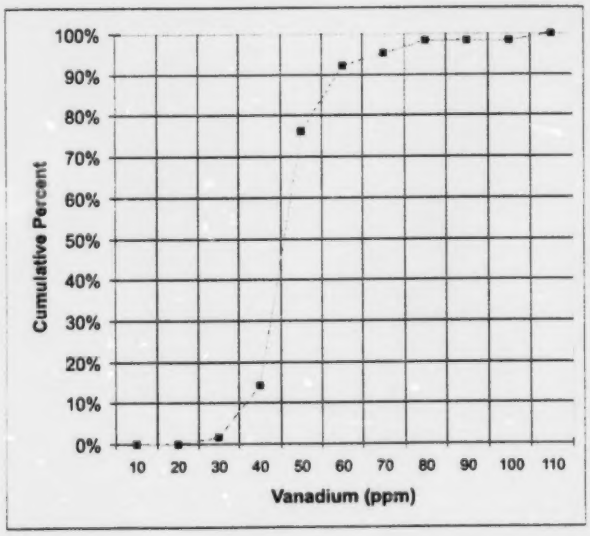
- Glacial Deposits
- Orthogneiss
- Granitoid Rocks; quartz diorite, granite
- Gabbro
- Metasedimentary Rocks
- Metavolcanic Rocks; basalt to andesite
- Metavolcanic Rocks; intermediate to felsic

Generalized from Tella *et al.*, 1997b

V		
Till Geochemistry < 0.002 mm	Sample Preparation: Analytical Preparation: Analytical Method: Detection Limit:	Centrifuge & Decantation Nitric-aqua regia partial leach ICP-AES 1 ppm

Descriptive Statistics	
Mean	48.84
Standard Error	1.32
Median	48.00
Mode	50.00
Standard Deviation	10.49
Sample Variance	110.04
Kurtosis	12.53
Skewness	2.81
Range	76.00
Minimum	28.00
Maximum	104.00
Sum	3077.00
Count	63
Maximum	104.00
99th percentile	87.88
98th percentile	76.56
95th percentile	65.60
90th percentile	56.60
75th percentile	50.00
Median	48.00
25th percentile	44.00
5th percentile	38.10
Minimum	28.00

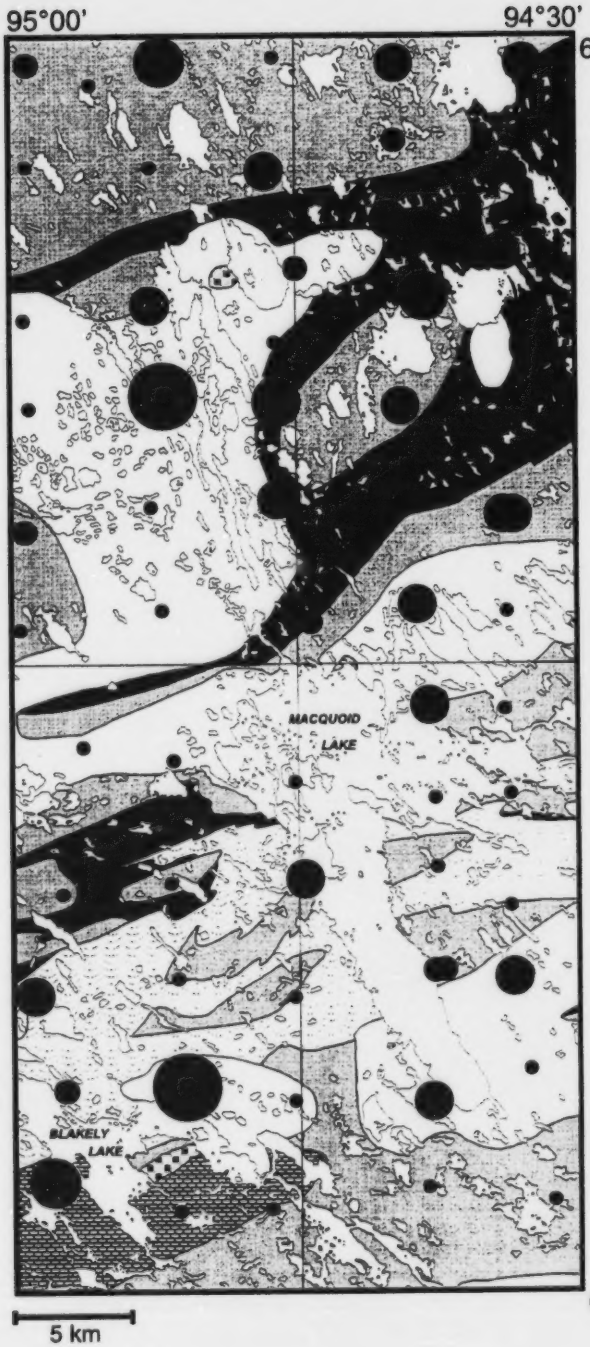




V

Vanadium (ppm)

(<0.002 mm fraction)



Vanadium (ppm)
(<0.002 mm fraction)

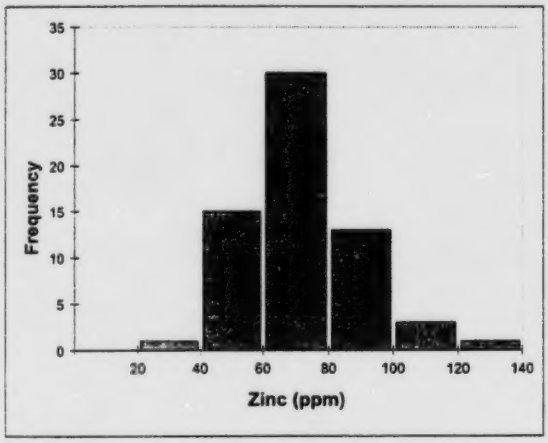
	Min	Max	%tile	# Samp
●	28	48	50th	31
●	48	50	75th	9
●	50	57	90th	16
●	57	77	98th	5
●	77	104	100th	2

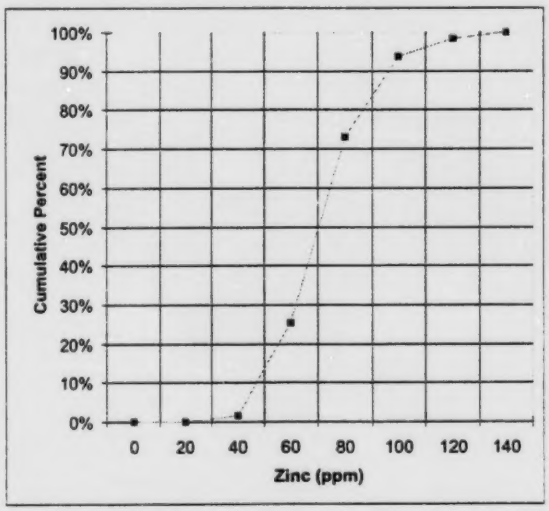
- Glacial Deposits
- Orthogneiss
- Granitoid Rocks; quartz diorite, granite
- Gabbro
- Metasedimentary Rocks
- Metavolcanic Rocks; basalt to andesite
- Metavolcanic Rocks; intermediate to felsic

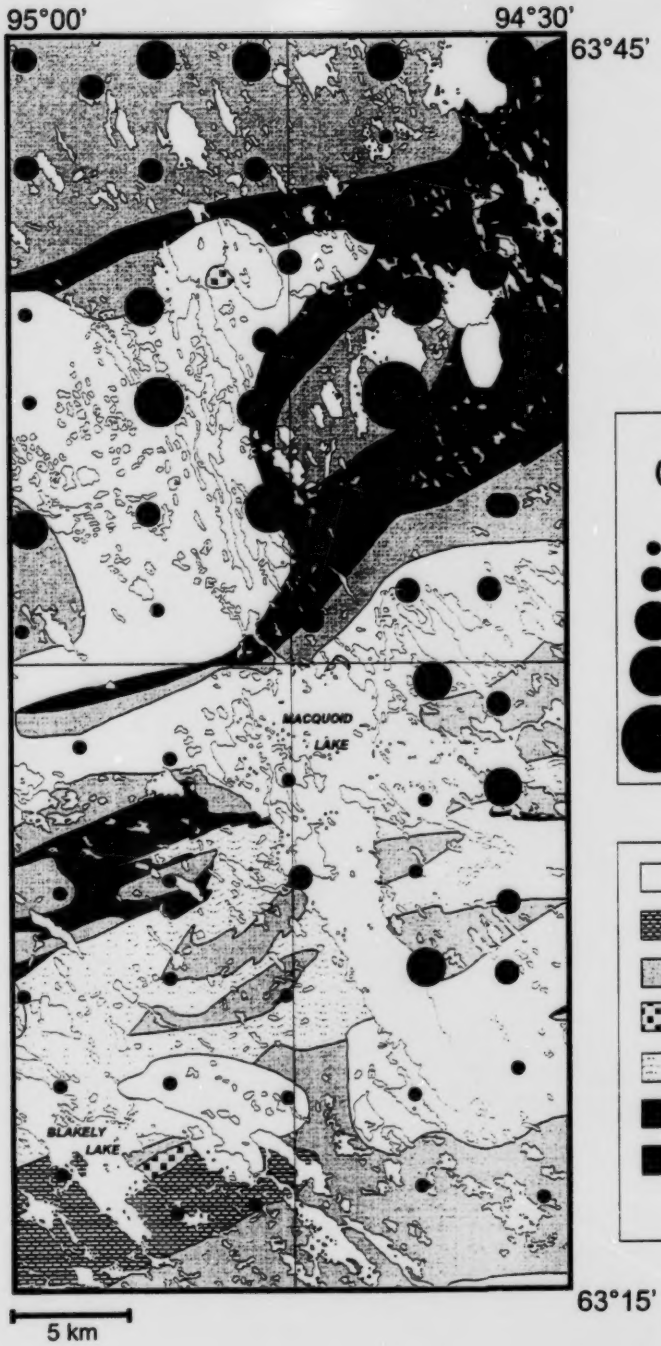
Generalized from Tella *et al.*, 1997b

Zn		
Till Geochemistry	Sample Preparation:	Centrifuge & Decantation
< 0.002 mm	Analytical Preparation:	Nitric-aqua regia partial leach
	Analytical Method:	ICP-AES
	Detection Limit:	2 ppm

Descriptive Statistics	
Mean	72.92
Standard Error	2.14
Median	70.00
Mode	70.00
Standard Deviation	16.96
Sample Variance	287.72
Kurtosis	0.65
Skewness	0.53
Range	94.00
Minimum	30.00
Maximum	124.00
Sum	4594.00
Count	63
Maximum	124.00
99th percentile	112.84
98th percentile	106.00
95th percentile	103.60
90th percentile	97.60
75th percentile	82.00
Median	70.00
25th percentile	61.00
5th percentile	50.40
Minimum	30.00







Zn

Zinc (ppm)

(<0.002 mm fraction)

Zinc (ppm) (<0.002 mm fraction)

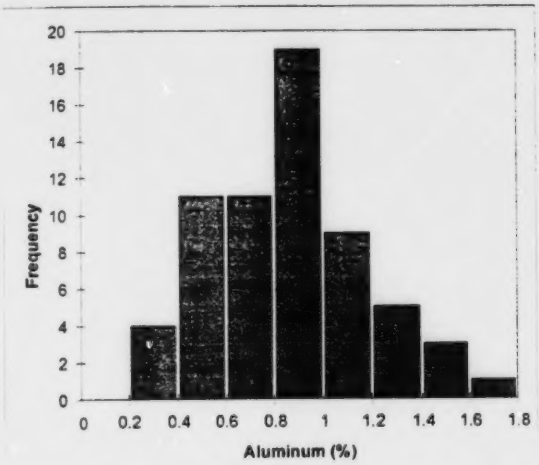
	Min	Max	%tile	# Samp
	30	70	50th	27
	70	82	75th	19
	82	98	90th	10
	98	106	98th	4
	106	124	100th	3

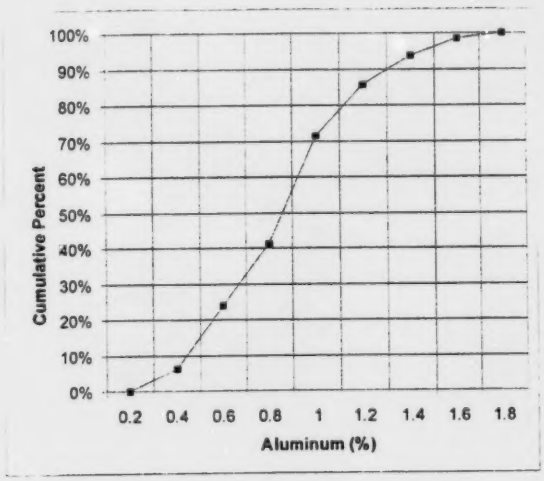
- Glacial Deposits
- Orthogneiss
- Granitoid Rocks; quartz diorite, granite
- Gabbro
- Metasedimentary Rocks
- Metavolcanic Rocks; basalt to andesite
- Metavolcanic Rocks; intermediate to felsic

Generalized from Tella *et al.*, 1997b

Al		
Till Geochemistry	Sample Preparation:	Dry sieve; <230 mesh screen
< 0.063 mm	Analytical Preparation:	Nitric-aqua regia partial leach
	Analytical Method:	ICP-AES
	Detection Limit:	0.01%

Descriptive Statistics	
Mean	0.86
Standard Error	0.04
Median	0.89
Mode	0.99
Standard Deviation	0.33
Sample Variance	0.11
Kurtosis	-0.17
Skewness	0.27
Range	1.47
Minimum	0.23
Maximum	1.70
Sum	54.36
Count	63
Maximum	1.70
99th percentile	1.61
98th percentile	1.56
95th percentile	1.44
90th percentile	1.24
75th percentile	1.03
Median	0.89
25th percentile	0.61
5th percentile	0.36
Minimum	0.23

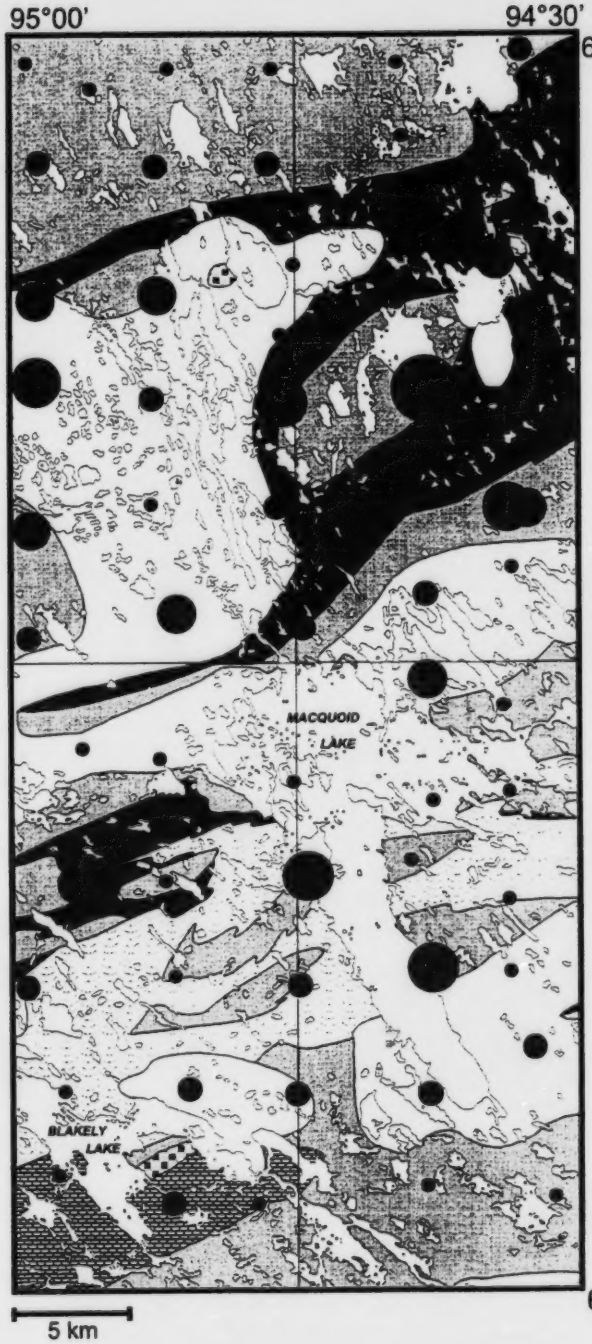




Al

Aluminum (%)

(<0.063 mm fraction)



Aluminum (%)
(<0.063 mm fraction)

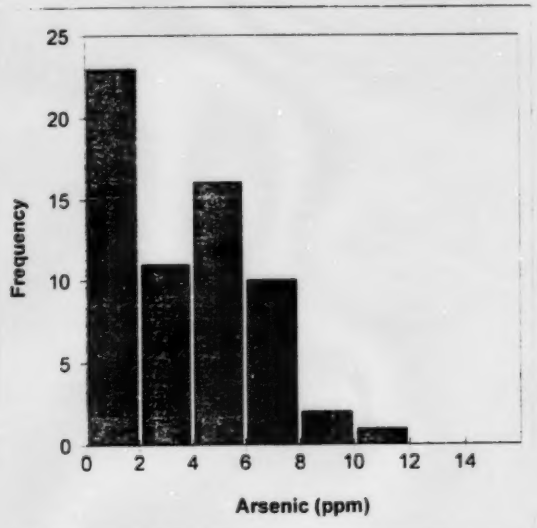
	Min	Max	%tile	# Samp
●	0.23	0.89	50th	31
●	0.89	1.03	75th	16
●	1.03	1.24	90th	8
●	1.24	1.56	98th	6
●	1.56	1.7	100th	2

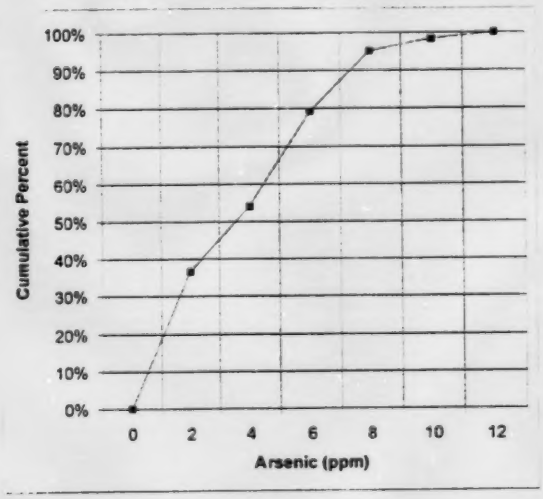
- Glacial Deposits
- Orthogneiss
- Granitoid Rocks; quartz diorite, granite
- Gabbro
- Metasedimentary Rocks
- Metavolcanic Rocks; basalt to andesite
- Metavolcanic Rocks; intermediate to felsic

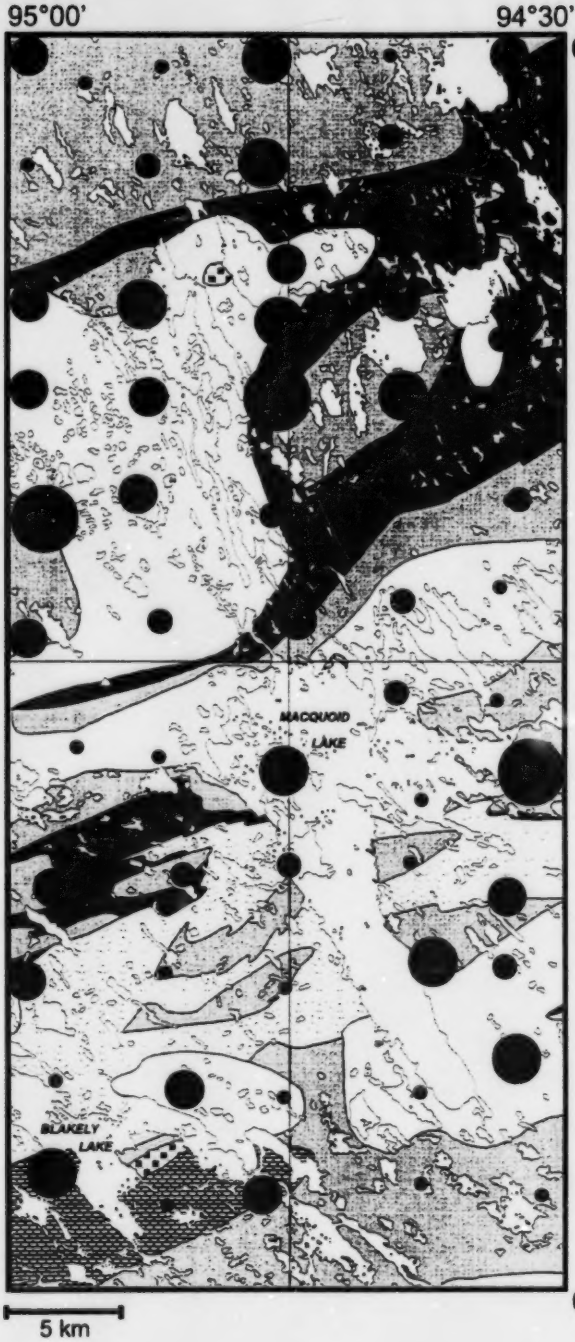
Generalized from Tella *et al.*, 1997b

As		
Till Geochemistry	Sample Preparation:	Dry sieve; <230 mesh screen
< 0.063 mm	Analytical Preparation:	Nitric-aqua regia partial leach
	Analytical Method:	ICP-AES
	Detection Limit:	2 ppm

Descriptive Statistics	
Mean	4.54
Standard Error	0.36
Median	4.00
Mode	6.00
Standard Deviation	2.82
Sample Variance	7.96
Kurtosis	-0.71
Skewness	0.36
Range	11.00
Minimum	1.00
Maximum	12.00
Sum	286.00
Count	63
Maximum	12.00
99th percentile	10.76
98th percentile	10.00
95th percentile	8.00
90th percentile	8.00
75th percentile	6.00
Median	4.00
25th percentile	2.00
5th percentile	1.00
Minimum	1.00







As

Arsenic (ppm)

(<0.063 mm fraction)

Arsenic (ppm)
(<0.063 mm fraction)

	Min	Max	%tile	# Samp
●	1.00	4.00	50th	23
●	4.00	6.00	75th	11
●	6.00	8.00	90th	16
●	8.00	10.80	98th	10
●	10.80	12.00	100th	3

- Glacial Deposits
- Orthogneiss
- Granitoid Rocks; quartz diorite, granite
- Gabbro
- Metasedimentary Rocks
- Metavolcanic Rocks; basalt to andesite
- Metavolcanic Rocks; intermediate to felsic

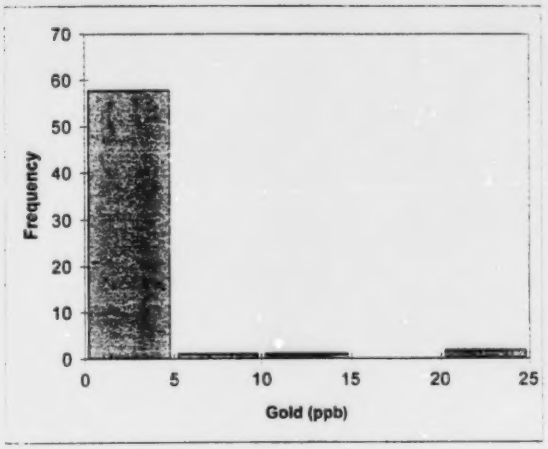
Generalized from Tella *et al.*, 1997b

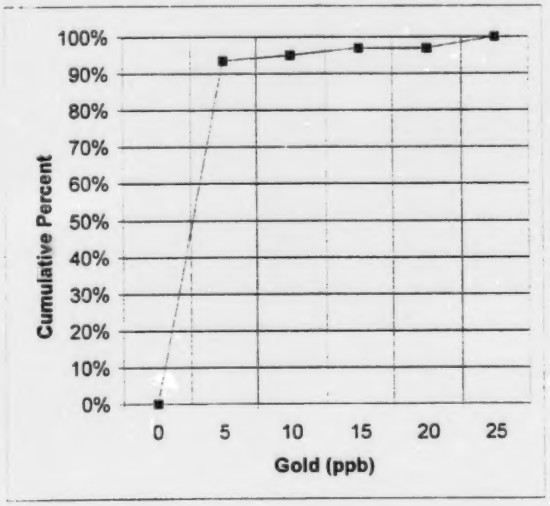
Au

Till Geochemistry
< 0.063 mm

Sample Preparation:	Dry sieve; <230 mesh screen
Analytical Preparation:	Nitric-aqua regia partial leach
Analytical Method:	FA-ICP-AFS
Detection Limit:	2 ppb

Descriptive Statistics	
Mean	2.06
Standard Error	0.55
Median	1.00
Mode	1.00
Standard Deviation	4.34
Sample Variance	18.85
Kurtosis	17.92
Skewness	4.27
Range	23.00
Minimum	1.00
Maximum	24.00
Sum	128.00
Count	62
Maximum	24.00
99th percentile	22.78
98th percentile	20.24
95th percentile	9.55
90th percentile	1.00
75th percentile	1.00
Median	1.00
25th percentile	1.00
5th percentile	1.00
Minimum	1.00

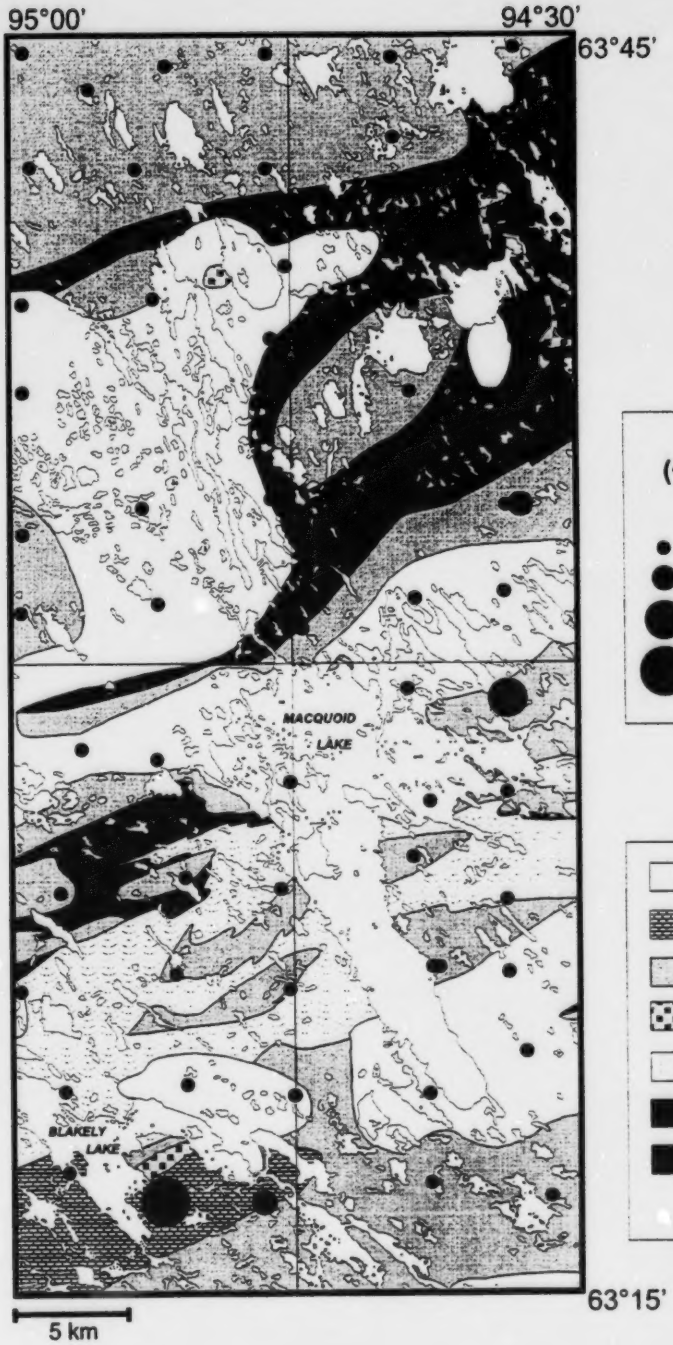




Au

Gold (ppb)

(<0.063 mm fraction)



Gold (ppb)
(<0.063 mm fraction)

	Min	Max	%tile	# Samp
●	1	10	90th	58
●	10	20	95th	2
●	20	23	98th	1
●	23	24	100th	1

- Glacial Deposits
- Orthogneiss
- Granitoid Rocks; quartz diorite, granite
- Gabbro
- Metasedimentary Rocks
- Metavolcanic Rocks; basalt to andesite
- Metavolcanic Rocks; intermediate to felsic

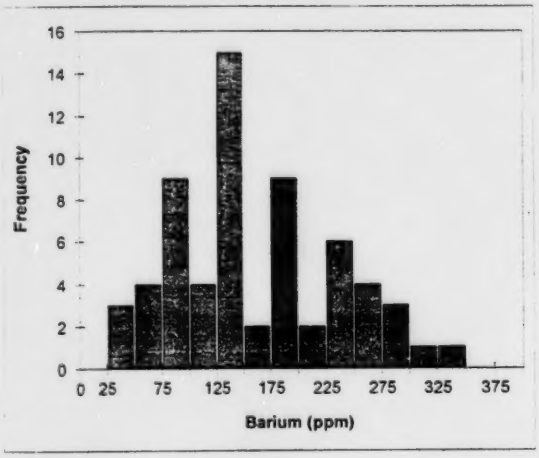
Generalized from Tella *et al.*, 1997b

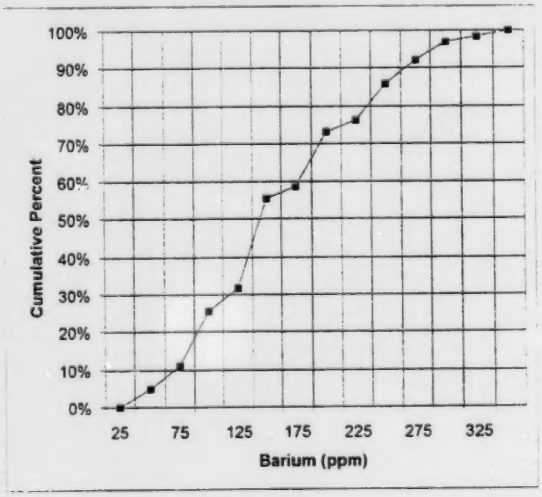
Ba

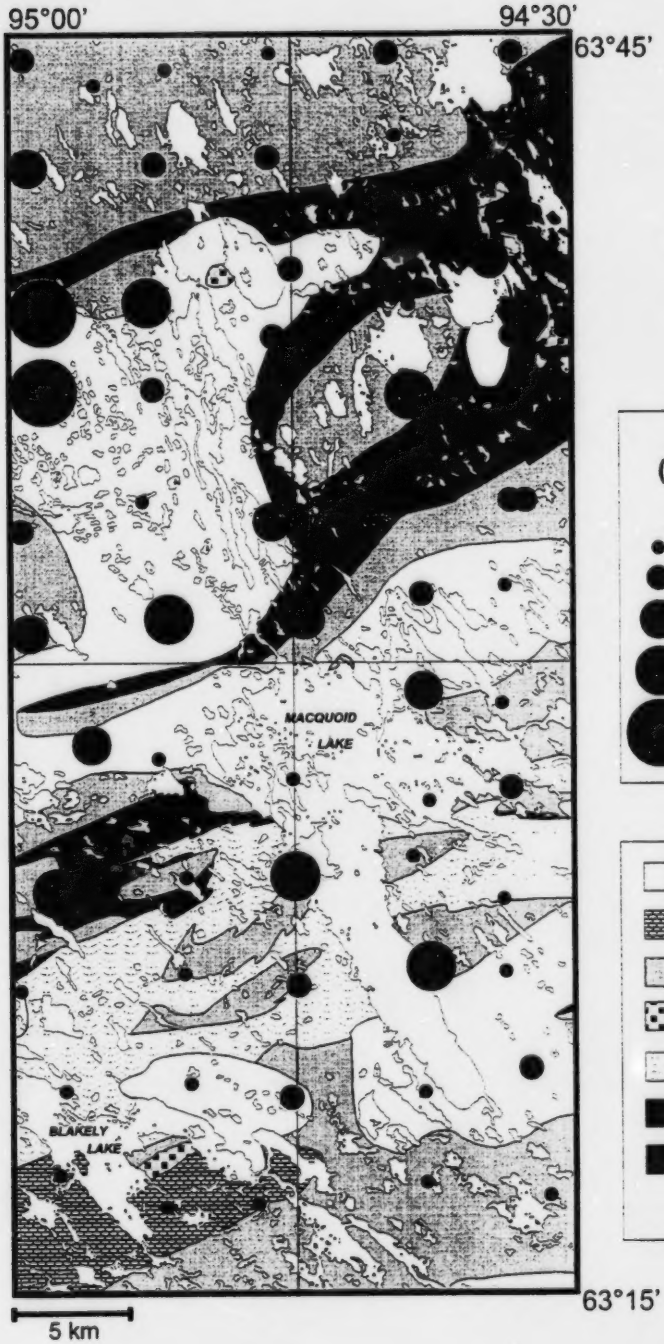
Till Geochemistry
< 0.063 mm

Sample Preparation:	Dry sieve; <230 mesh screen
Analytical Preparation:	Nitric-aqua regia partial leach
Analytical Method:	ICP-AES
Detection Limit:	10 ppm

Descriptive Statistics	
Mean	162.54
Standard Error	9.19
Median	150.00
Mode	150.00
Standard Deviation	72.98
Sample Variance	5325.70
Kurtosis	-0.65
Skewness	0.37
Range	290.00
Minimum	40.00
Maximum	330.00
Sum	10240.00
Count	63
Maximum	330.00
99th percentile	317.60
98th percentile	307.60
95th percentile	6.90
90th percentile	260.00
75th percentile	210.00
Median	150.00
25th percentile	105.00
5th percentile	60.00
Minimum	40.00







Ba

Barium (ppm)

(<0.063 mm fraction)

Barium (ppm) (<0.063 mm fraction)

Min	Max	%tile	# Samp
40	150	50th	28
150	210	75th	18
210	260	90th	8
260	308	98th	7
308	330	100th	2

- Glacial Deposits
- Orthogneiss
- Granitoid Rocks; quartz diorite, granite
- Gabbro
- Metasedimentary Rocks
- Metavolcanic Rocks; basalt to andesite
- Metavolcanic Rocks; intermediate to felsic

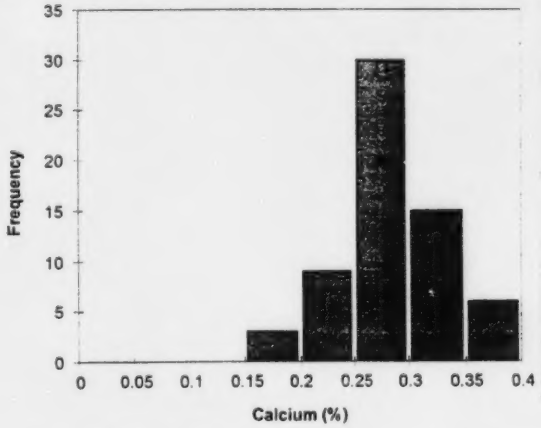
Generalized from Tella *et al.*, 1997b

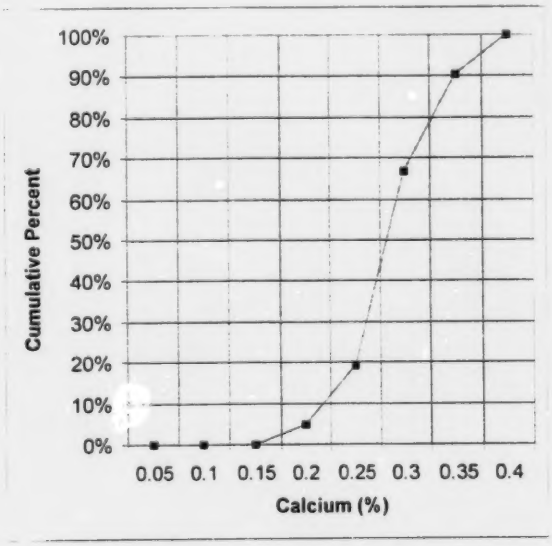
Ca

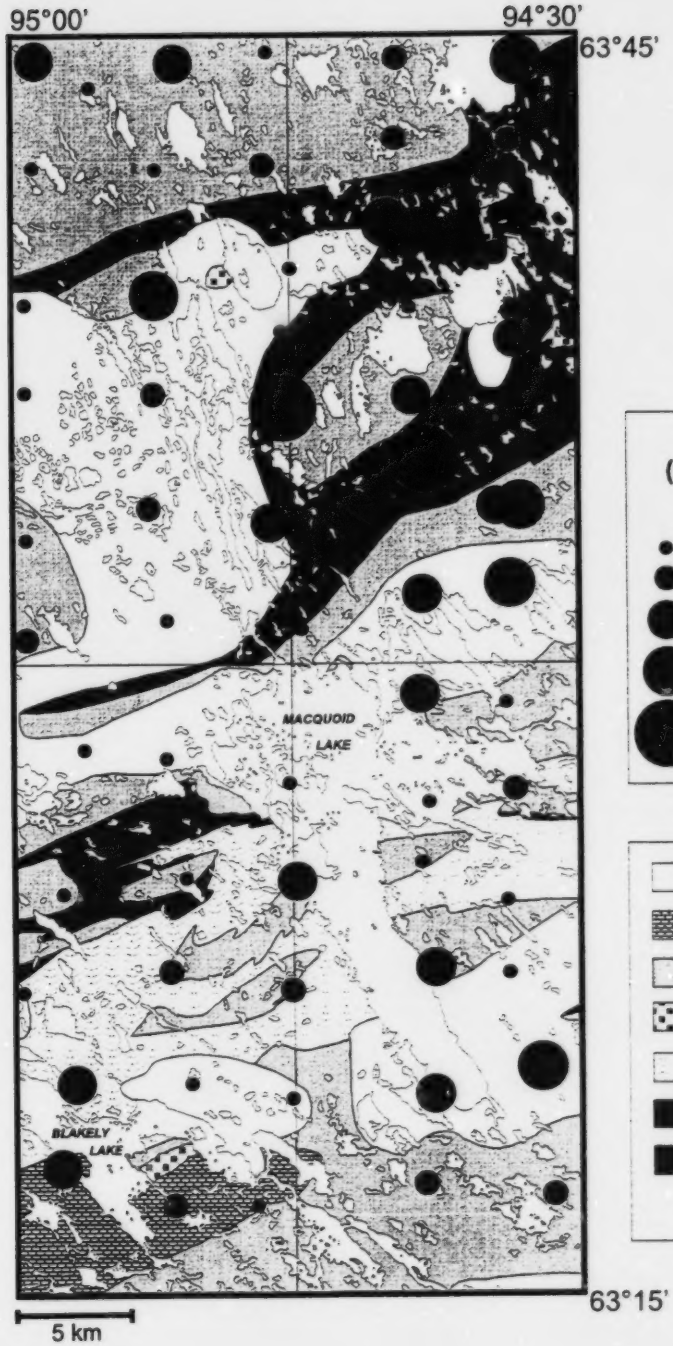
Till Geochemistry
< 0.063 mm

Sample Preparation:	Dry sieve; <230 mesh screen
Analytical Preparation:	Nitric-aqua regia partial leach
Analytical Method:	ICP-AES
Detection Limit:	0.01%

Descriptive Statistics	
Mean	0.29
Standard Error	0.01
Median	0.29
Mode	0.29
Standard Deviation	0.04
Sample Variance	0.00
Kurtosis	0.56
Skewness	-0.06
Range	0.22
Minimum	0.17
Maximum	0.39
Sum	18.31
Count	63
Maximum	0.39
99th percentile	0.38
98th percentile	0.38
95th percentile	0.37
90th percentile	0.35
75th percentile	0.31
Median	0.29
25th percentile	0.26
5th percentile	0.24
Minimum	0.17







Ca

Calcium (%)

(<0.063 mm fraction)

Calcium (%)
(<0.063 mm fraction)

	Min	Max	%tile	# Samp
●	0.17	0.29	50th	27
●	0.29	0.31	75th	15
●	0.31	0.35	90th	13
●	0.35	0.38	98th	6
●	0.38	0.39	100th	2

- Glacial Deposits
- Orthogneiss
- Granitoid Rocks; quartz diorite, granite
- Gabbro
- Metasedimentary Rocks
- Metavolcanic Rocks; basalt to andesite
- Metavolcanic Rocks; intermediate to felsic

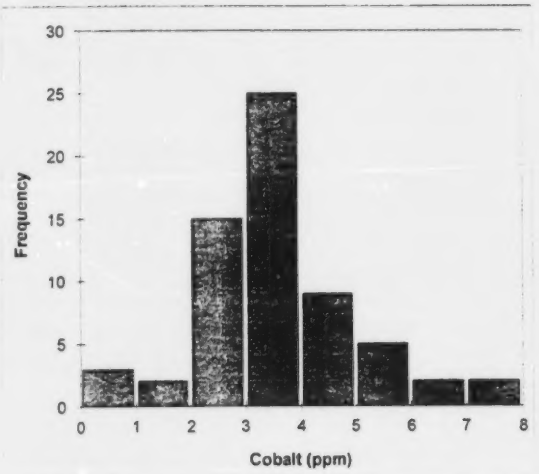
Generalized from Tella *et al.*, 1997b

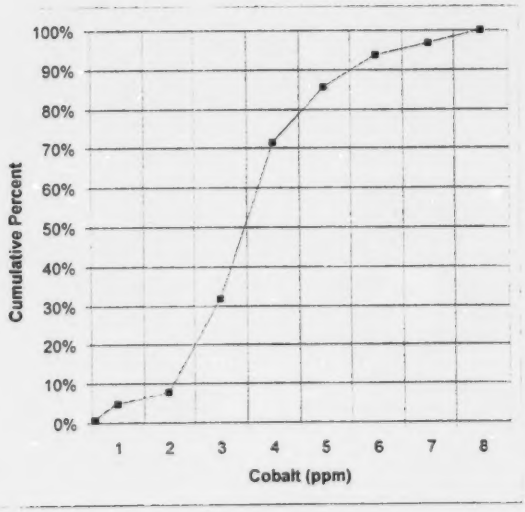
Co

Till Geochemistry
< 0.063 mm

Sample Preparation:	Dry sieve; <230 mesh screen
Analytical Preparation:	Nitric-aqua regia partial leach
Analytical Method:	ICP-AES
Detection Limit:	1 ppm

Descriptive Statistics	
Mean	4.08
Standard Error	0.18
Median	4.00
Mode	4.00
Standard Deviation	1.44
Sample Variance	2.07
Kurtosis	1.06
Skewness	0.49
Range	7.00
Minimum	1.00
Maximum	8.00
Sum	257.00
Count	63
Maximum	8.00
99th percentile	8.00
98th percentile	7.76
95th percentile	6.90
90th percentile	6.00
75th percentile	5.00
Median	4.00
25th percentile	3.00
5th percentile	2.00
Minimum	1.00

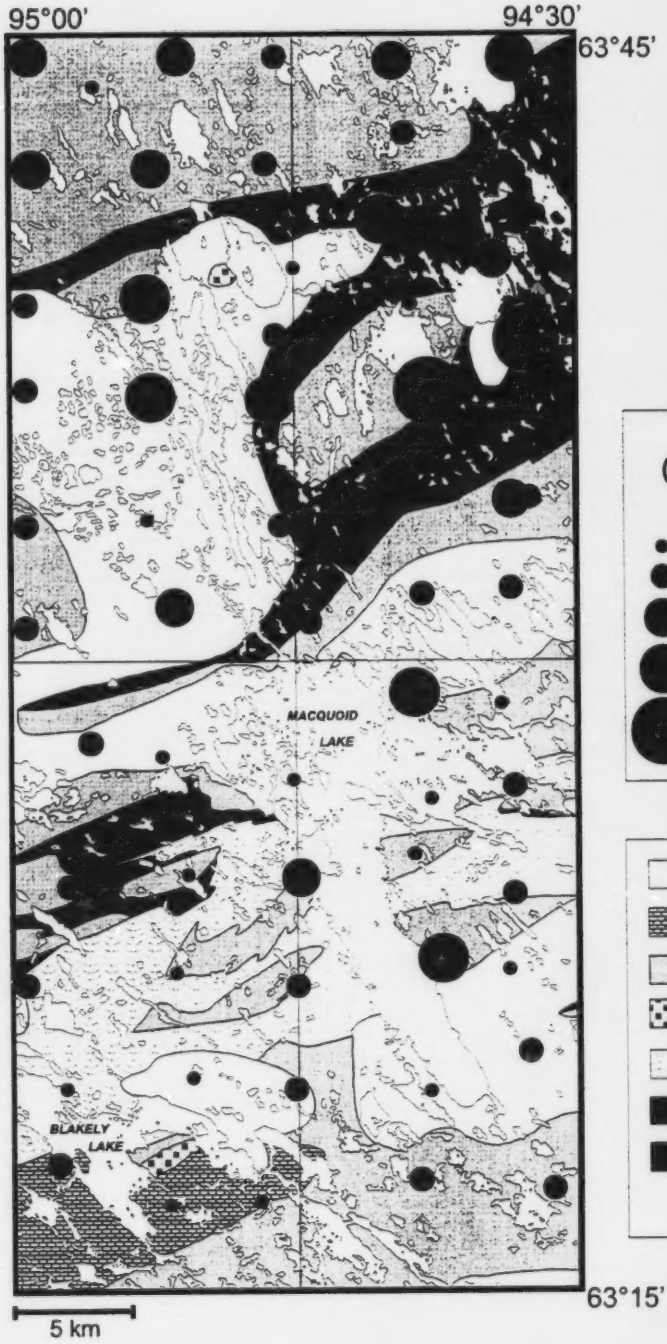




Co

Cobalt (ppm)

(<0.063 mm fraction)



Cobalt (ppm)
(<0.063 mm fraction)

	Min	Max	%tile	# Samp
●	1.00	4.00	50th	20
●	4.00	5.00	75th	25
●	5.00	6.00	90th	9
●	6.00	7.76	98th	7
●	7.76	8.00	100th	2

- Glacial Deposits
- Orthogneiss
- Granitoid Rocks; quartz diorite, granite
- Gabbro
- Metasedimentary Rocks
- Metavolcanic Rocks; basalt to andesite
- Metavolcanic Rocks; intermediate to felsic

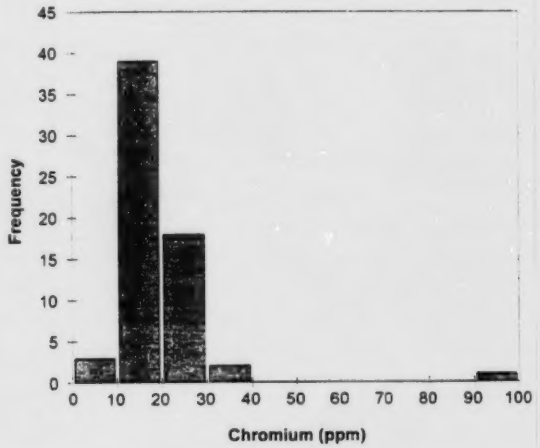
Generalized from Tella *et al.*, 1997b

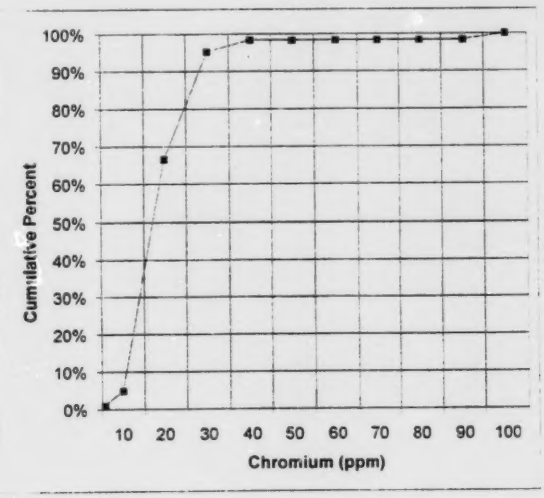
Cr

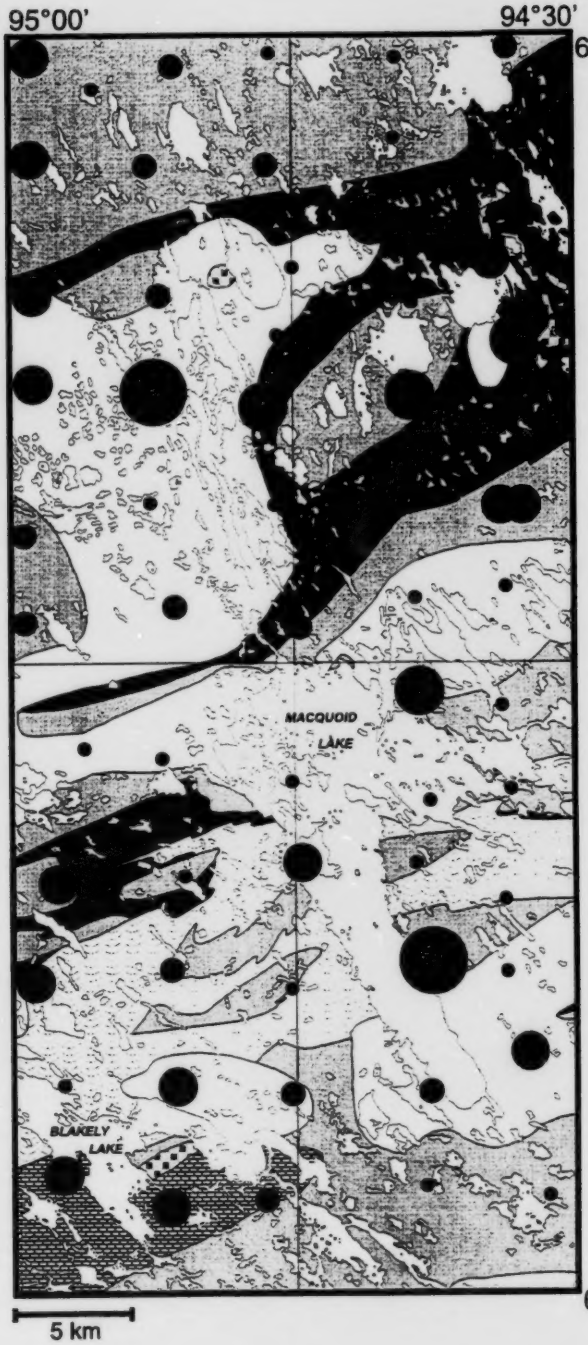
Till Geochemistry
< 0.063 mm

Sample Preparation:	Dry sieve; <230 mesh screen
Analytical Preparation:	Nitric-aqua regia partial leach
Analytical Method:	ICP-AES
Detection Limit:	1 ppm

Descriptive Statistics	
Mean	20.03
Standard Error	1.37
Median	19.00
Mode	20.00
Standard Deviation	10.87
Sample Variance	118.16
Kurtosis	37.24
Skewness	5.43
Range	87.00
Minimum	8.00
Maximum	95.00
Sum	1262.00
Count	63
Maximum	95.00
99th percentile	56.56
98th percentile	32.76
95th percentile	29.70
90th percentile	25.80
75th percentile	21.00
Median	19.00
25th percentile	16.00
5th percentile	11.00
Minimum	8.00







Cr

Chromium (ppm)

(<0.063 mm fraction)

Chromium (ppm) (<0.063 mm fraction)

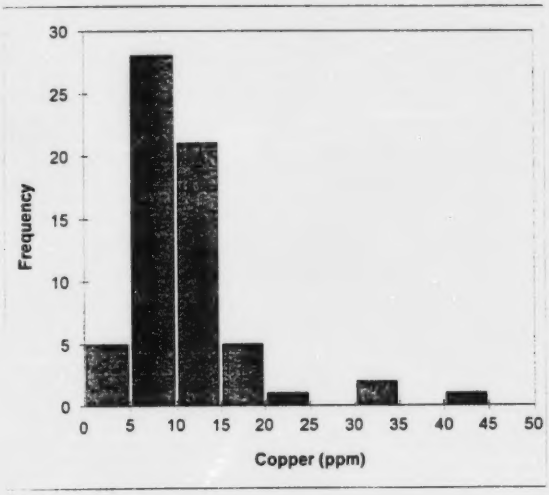
	Min	Max	%tile	# Samp
●	8	19	50th	28
●	19	21	75th	14
●	21	26	90th	14
●	26	33	98th	5
●	33	95	100th	2

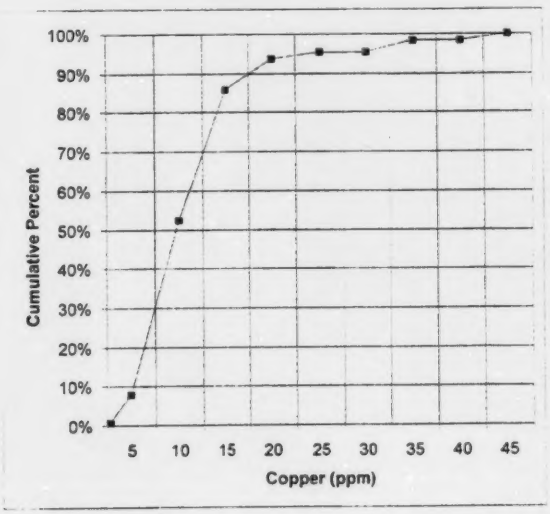
- Glacial Deposits
- Orthogneiss
- Granitoid Rocks; quartz diorite, granite
- Gabbro
- Metasedimentary Rocks
- Metavolcanic Rocks; basalt to andesite
- Metavolcanic Rocks; intermediate to felsic

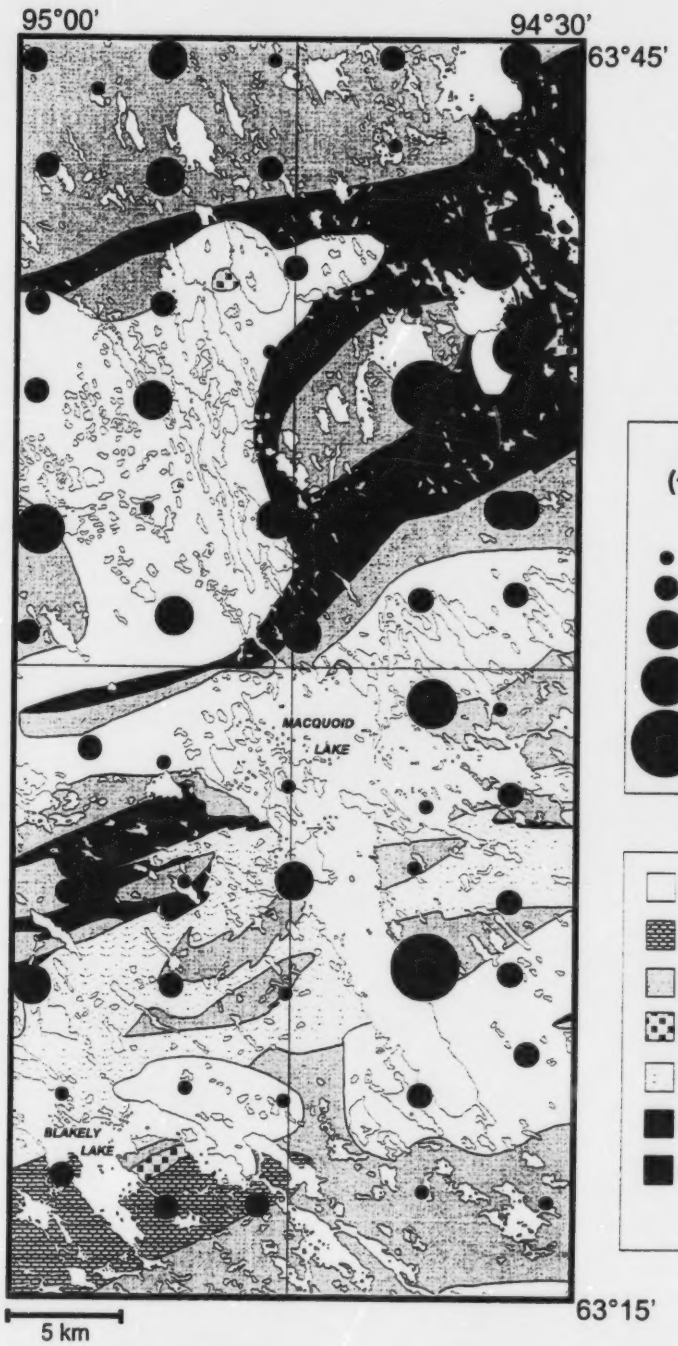
Generalized from Tella *et al.*, 1997b

Cu		
Till Geochemistry	Sample Preparation:	Dry sieve; <230 mesh screen
< 0.063 mm	Analytical Preparation:	Nitric-aqua regia partial leach
	Analytical Method:	ICP-AES
	Detection Limit:	1 ppm

Descriptive Statistics	
Mean	11.63
Standard Error	0.83
Median	10.00
Mode	10.00
Standard Deviation	6.59
Sample Variance	43.40
Kurtosis	7.70
Skewness	2.38
Range	40.00
Minimum	1.00
Maximum	41.00
Sum	733.00
Count	63
Maximum	41.00
99th percentile	35.42
98th percentile	32.00
95th percentile	23.50
90th percentile	16.80
75th percentile	13.00
Median	10.00
25th percentile	8.00
5th percentile	4.10
Minimum	1.00







Cu

Copper (ppm)

(<0.063 mm fraction)

Copper (ppm) (<0.063 mm fraction)

Min	Max	%tile	# Samp
1	10	50th	21
10	13	75th	24
13	17	90th	11
17	32	98th	4
32	41	100th	3

- Glacial Deposits
- Orthogneiss
- Granitoid Rocks; quartz diorite, granite
- Gabbro
- Metasedimentary Rocks
- Metavolcanic Rocks; basalt to andesite
- Metavolcanic Rocks; intermediate to felsic

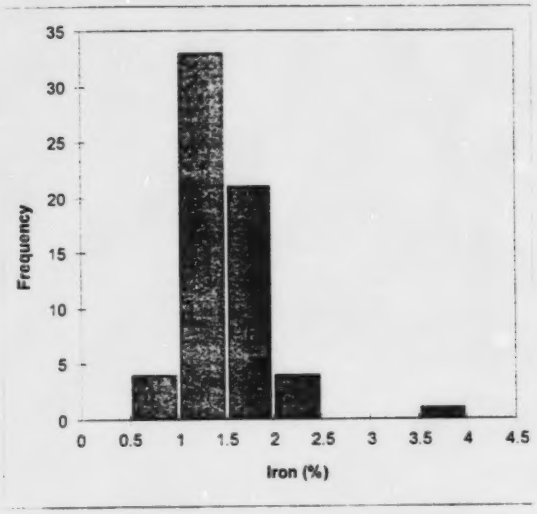
Generalized from Tella *et al.*, 1997b

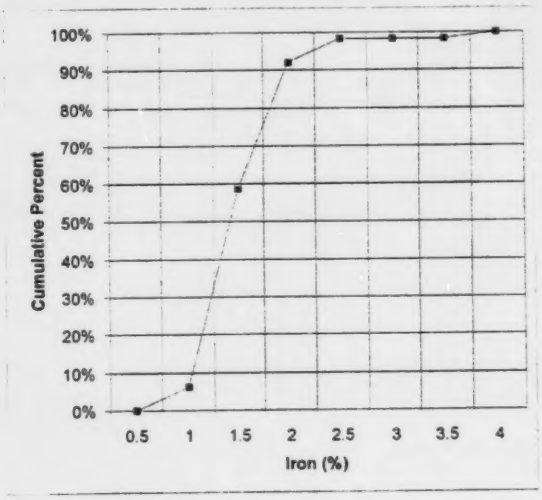
Fe

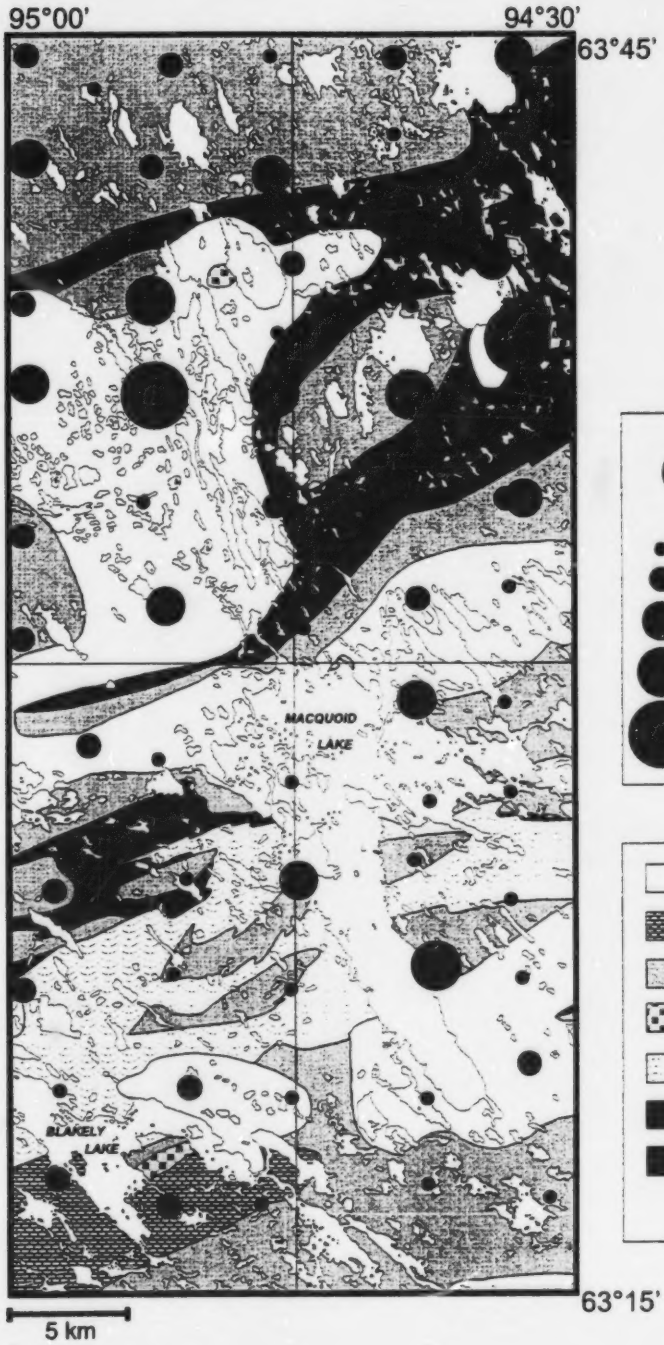
Till Geochemistry
< 0.063 mm

Sample Preparation:	Dry sieve; <230 mesh screen
Analytical Preparation:	Nitric-aqua regia partial leach
Analytical Method:	ICP-AES
Detection Limit:	0.01%

Descriptive Statistics	
Mean	1.47
Standard Error	0.05
Median	1.43
Mode	1.53
Standard Deviation	0.42
Sample Variance	0.18
Kurtosis	10.52
Skewness	2.21
Range	2.99
Minimum	0.66
Maximum	3.65
Sum	92.84
Count	63
Maximum	3.65
99th percentile	2.79
98th percentile	2.24
95th percentile	2.11
90th percentile	1.89
75th percentile	1.59
Median	1.43
25th percentile	1.22
5th percentile	0.99
Minimum	0.66







Fe

Iron (%)

(<0.063 mm fraction)

Iron (%)
(<0.063 mm fraction)

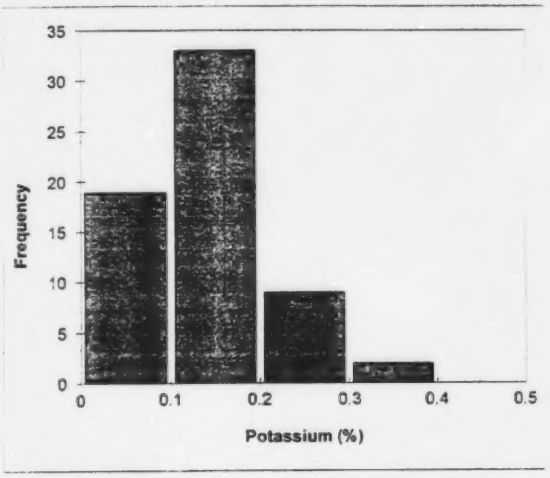
	Min	Max	%tile	# Samp
●	0.66	1.43	50th	29
●	1.43	1.59	75th	18
●	1.59	1.89	90th	9
●	1.89	2.24	98th	5
●	2.24	3.65	100th	2

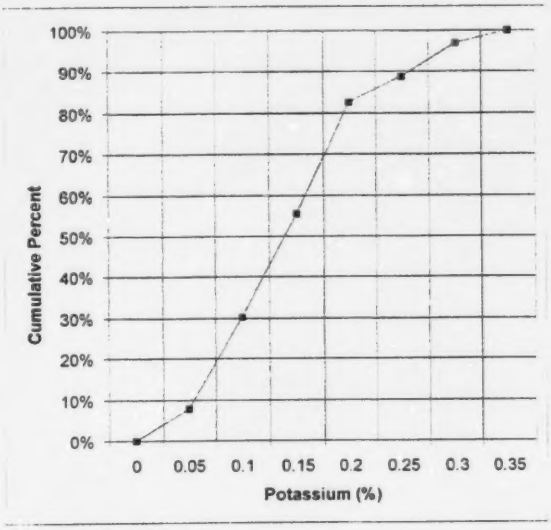
- Glacial Deposits
- Orthogneiss
- Granitoid Rocks; quartz diorite, granite
- Gabbro
- Metasedimentary Rocks
- Metavolcanic Rocks; basalt to andesite
- Metavolcanic Rocks; intermediate to felsic

Generalized from Tella *et al.*, 1997b

K		
Till Geochemistry	Sample Preparation:	Dry sieve; <230 mesh screen
< 0.063 mm	Analytical Preparation:	Nitric-aqua regia partial leach
	Analytical Method:	ICP-AES
	Detection Limit:	0.01%

Descriptive Statistics	
Mean	0.15
Standard Error	0.01
Median	0.14
Mode	0.14
Standard Deviation	0.08
Sample Variance	0.01
Kurtosis	-0.24
Skewness	0.46
Range	0.32
Minimum	0.01
Maximum	0.33
Sum	9.58
Count	63
Maximum	0.33
99th percentile	0.32
98th percentile	0.31
95th percentile	0.30
90th percentile	0.26
75th percentile	0.19
Median	0.14
25th percentile	0.10
5th percentile	0.05
Minimum	0.01

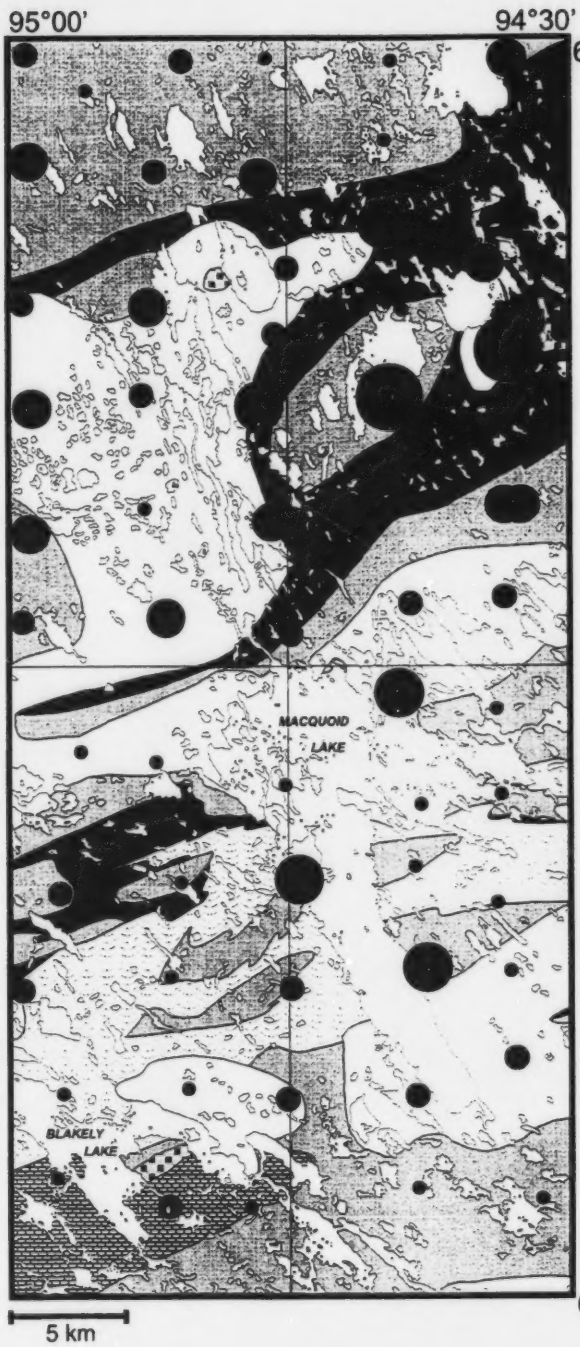




K

Potassium (%)

(<0.063 mm fraction)



Potassium (%)
(<0.063 mm fraction)

	Min	Max	%tile	# Samp
●	0.01	0.14	50th	26
●	0.14	0.19	75th	19
●	0.19	0.26	90th	11
●	0.26	0.31	98th	5
●	0.31	0.33	100th	2

- Glacial Deposits
- Orthogneiss
- Granitoid Rocks; quartz diorite, granite
- Gabbro
- Metasedimentary Rocks
- Metavolcanic Rocks; basalt to andesite
- Metavolcanic Rocks; intermediate to felsic

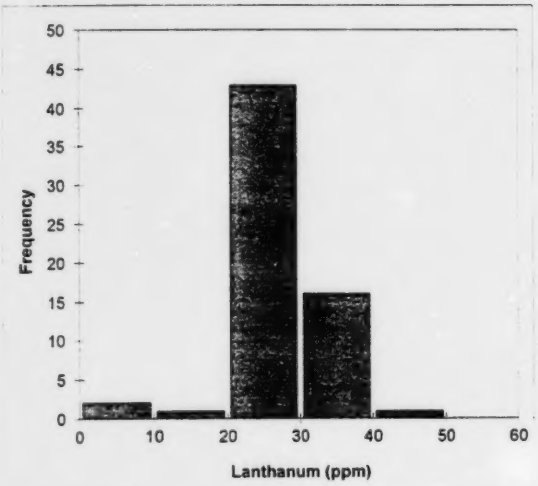
Generalized from Tella *et al.*, 1997b

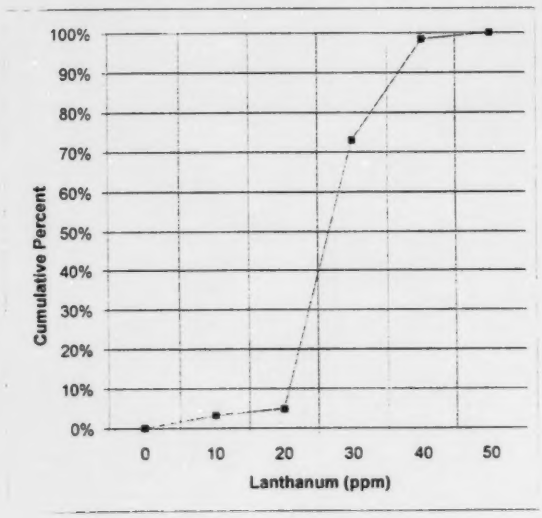
La

Till Geochemistry
< 0.063 mm

Sample Preparation:	Dry sieve; <230 mesh screen
Analytical Preparation:	Nitric-aqua regia partial leach
Analytical Method:	ICP-AES
Detection Limit:	10 ppm

Descriptive Statistics	
Mean	32.06
Standard Error	0.82
Median	30.00
Mode	30.00
Standard Deviation	6.52
Sample Variance	42.45
Kurtosis	3.39
Skewness	-0.59
Range	40.00
Minimum	10.00
Maximum	50.00
Sum	2020.00
Count	63
Maximum	50.00
99th percentile	43.80
98th percentile	40.00
95th percentile	40.00
90th percentile	40.00
75th percentile	40.00
Median	30.00
25th percentile	30.00
5th percentile	30.00
Minimum	10.00

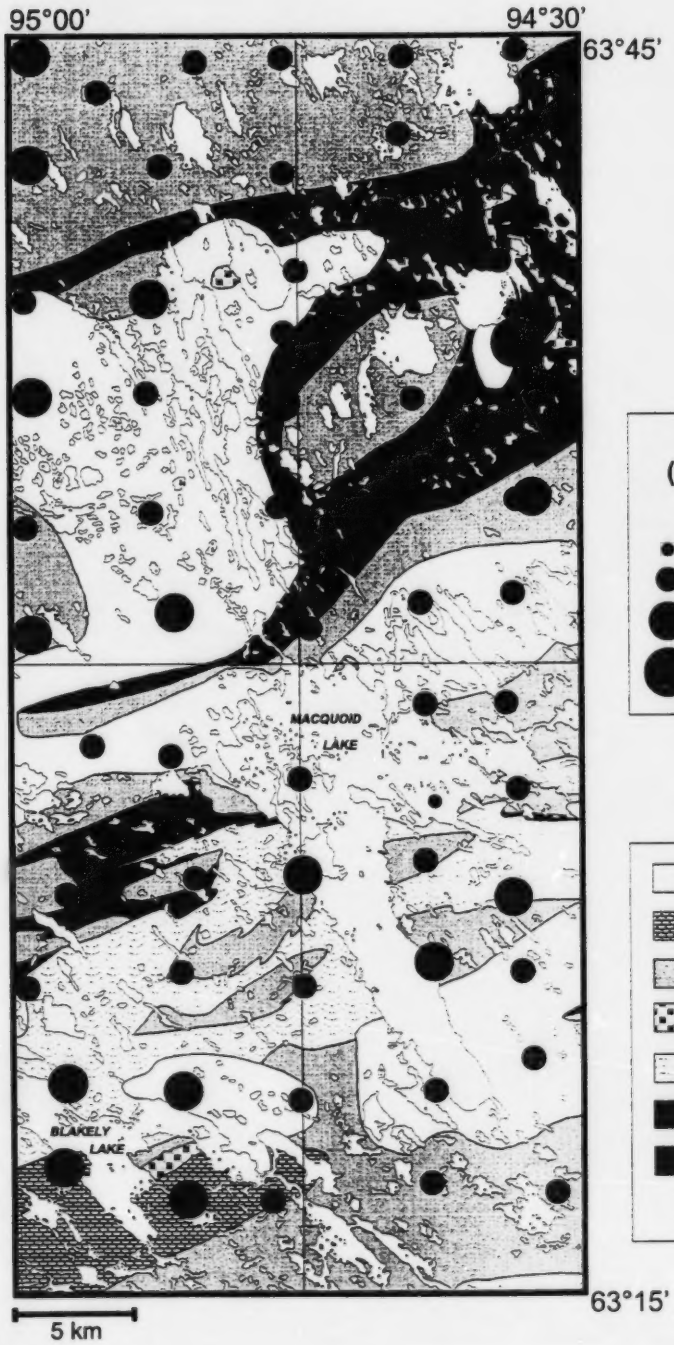




La

Lanthanum (ppm)

(<0.063 mm fraction)



Lanthanum (ppm)
(<0.063 mm fraction)

	Min	Max	%tile	# Samp
●	10	30	50th	3
●	30	40	75th	43
●	40	43.8	99th	16
●	43.8	50	100th	1

- Glacial Deposits
- Orthogneiss
- Granitoid Rocks; quartz diorite, granite
- Gabbro
- Metasedimentary Rocks
- Metavolcanic Rocks; basalt to andesite
- Metavolcanic Rocks; intermediate to felsic

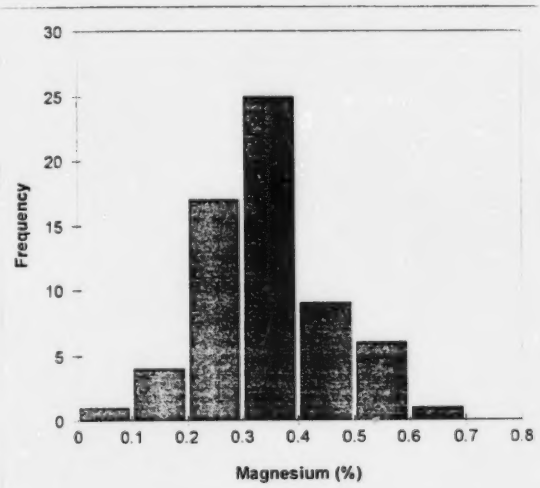
Generalized from Tella *et al.*, 1997b

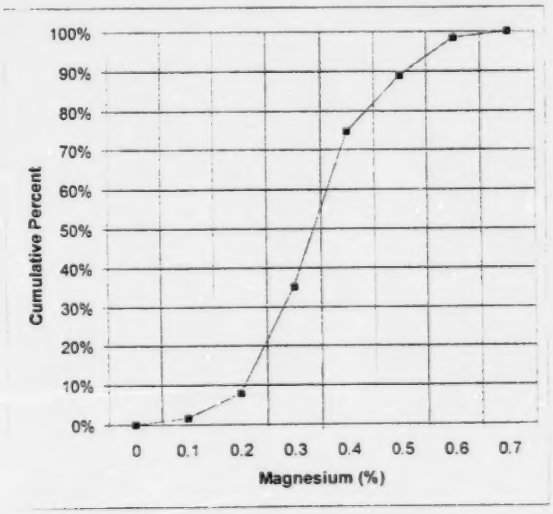
Mg

Till Geochemistry
< 0.063 mm

Sample Preparation:	Dry sieve; <230 mesh screen
Analytical Preparation:	Nitric-aqua regia partial leach
Analytical Method:	ICP-AES
Detection Limit:	0.01%

Descriptive Statistics	
Mean	0.34
Standard Error	0.01
Median	0.33
Mode	0.32
Standard Deviation	0.12
Sample Variance	0.01
Kurtosis	0.01
Skewness	0.48
Range	0.55
Minimum	0.09
Maximum	0.64
Sum	21.55
Count	63
Maximum	0.64
99th percentile	0.61
98th percentile	0.59
95th percentile	0.56
90th percentile	0.51
75th percentile	0.41
Median	0.33
25th percentile	0.27
5th percentile	0.18
Minimum	0.09

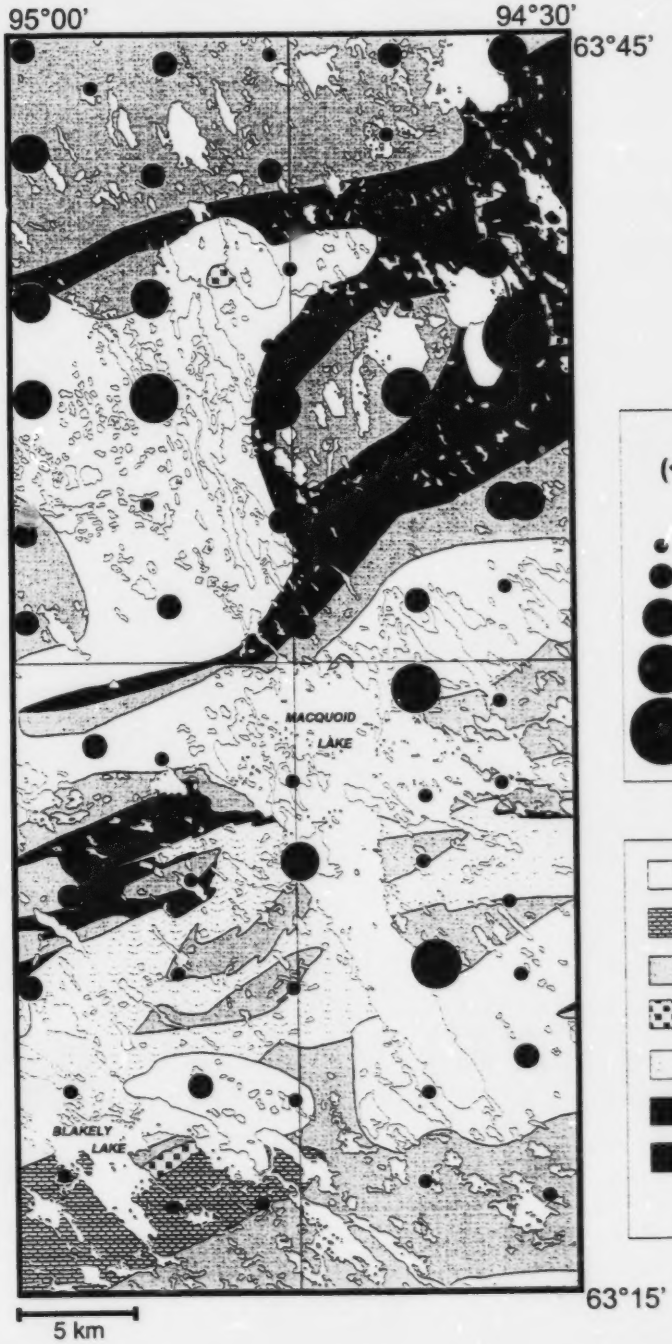




Mg

Magnesium (%)

(<0.063 mm fraction)



Magnesium (%)
(<0.063 mm fraction)

	Min	Max	%tile	# Samp
	0.09	0.33	50th	31
	0.33	0.41	75th	16
	0.41	0.51	90th	9
	0.51	0.61	98th	6
	0.61	0.64	100th	1

- Glacial Deposits
- Orthogneiss
- Granitoid Rocks; quartz diorite, granite
- Gabbro
- Metasedimentary Rocks
- Metavolcanic Rocks; basalt to andesite
- Metavolcanic Rocks; intermediate to felsic

Generalized from Tella *et al.*, 1997b

Mn

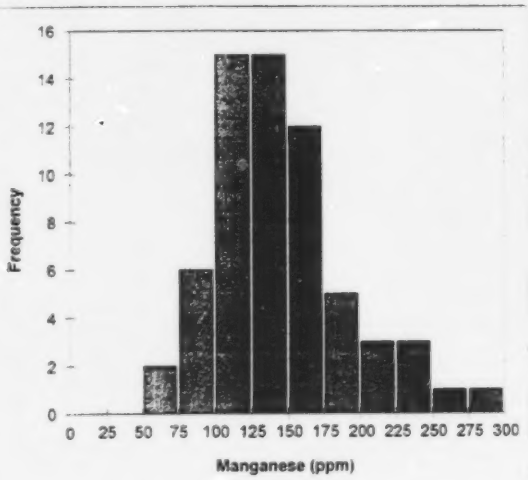
Till Geochemistry
< 0.063 mm

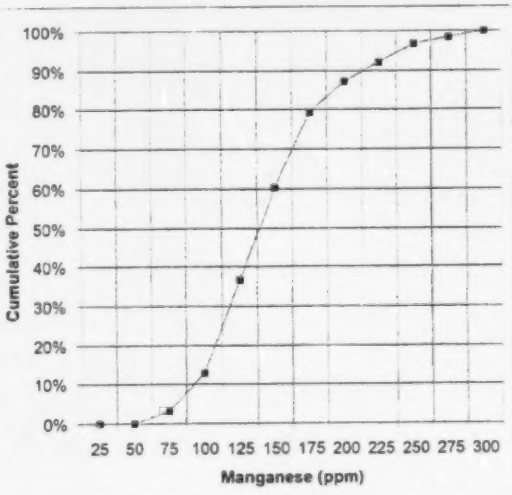
Sample Preparation:	Dry sieve; <230 mesh screen
Analytical Preparation:	Nitric-aqua regia partial leach
Analytical Method:	ICP-AES
Detection Limit:	5 ppm

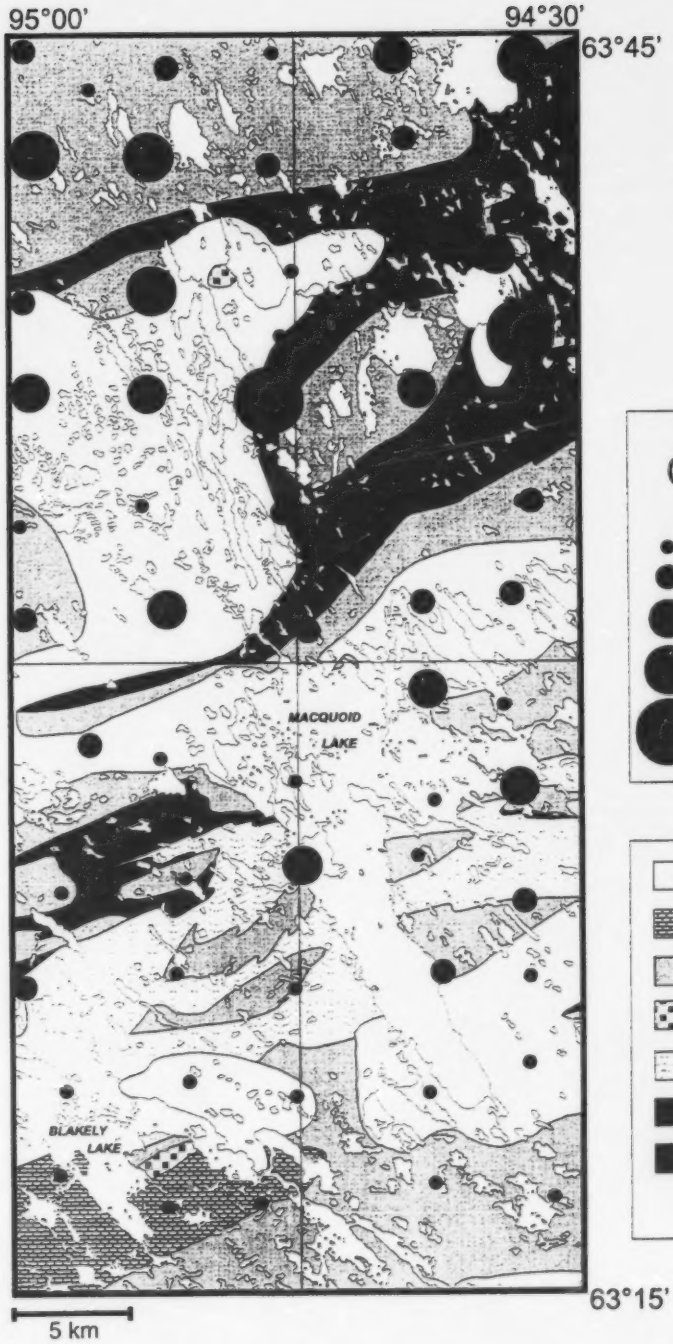
Descriptive Statistics

Mean	148.57
Standard Error	5.81
Median	145.00
Mode	120.00
Standard Deviation	46.08
Sample Variance	2123.73
Kurtosis	0.65
Skewness	0.77
Range	225.00
Minimum	60.00
Maximum	285.00
Sum	9360.00
Count	63

Maximum	285.00
99th percentile	272.60
98th percentile	259.00
95th percentile	230.00
90th percentile	219.00
75th percentile	170.00
Median	145.00
25th percentile	120.00
5th percentile	81.00
Minimum	60.00







Mn

Manganese (ppm)

(<0.063 mm fraction)

Manganese (ppm) (<0.063 mm fraction)

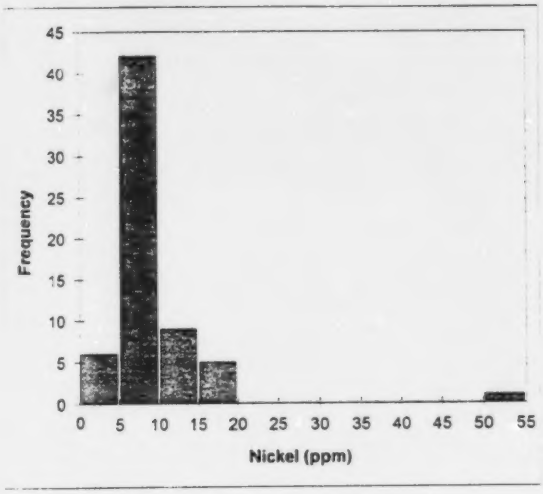
Min	Max	%tile	# Samp
60	145	50th	31
145	170	75th	16
170	219	90th	9
219	259	98th	5
259	285	100th	2

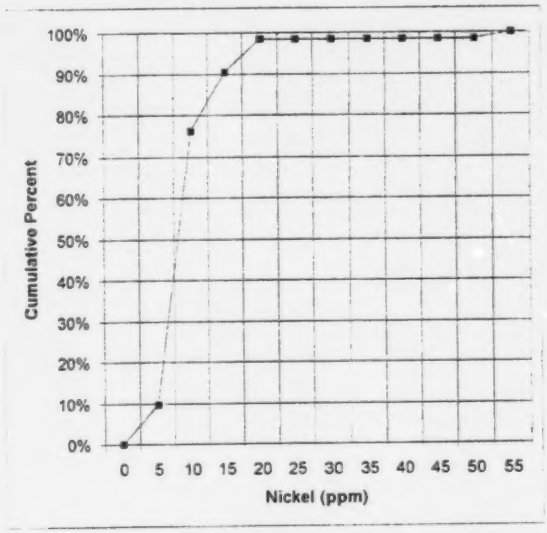
- Glacial Deposits
- Orthogneiss
- Granitoid Rocks; quartz diorite, granite
- Gabbro
- Metasedimentary Rocks
- Metavolcanic Rocks; basalt to andesite
- Metavolcanic Rocks; intermediate to felsic

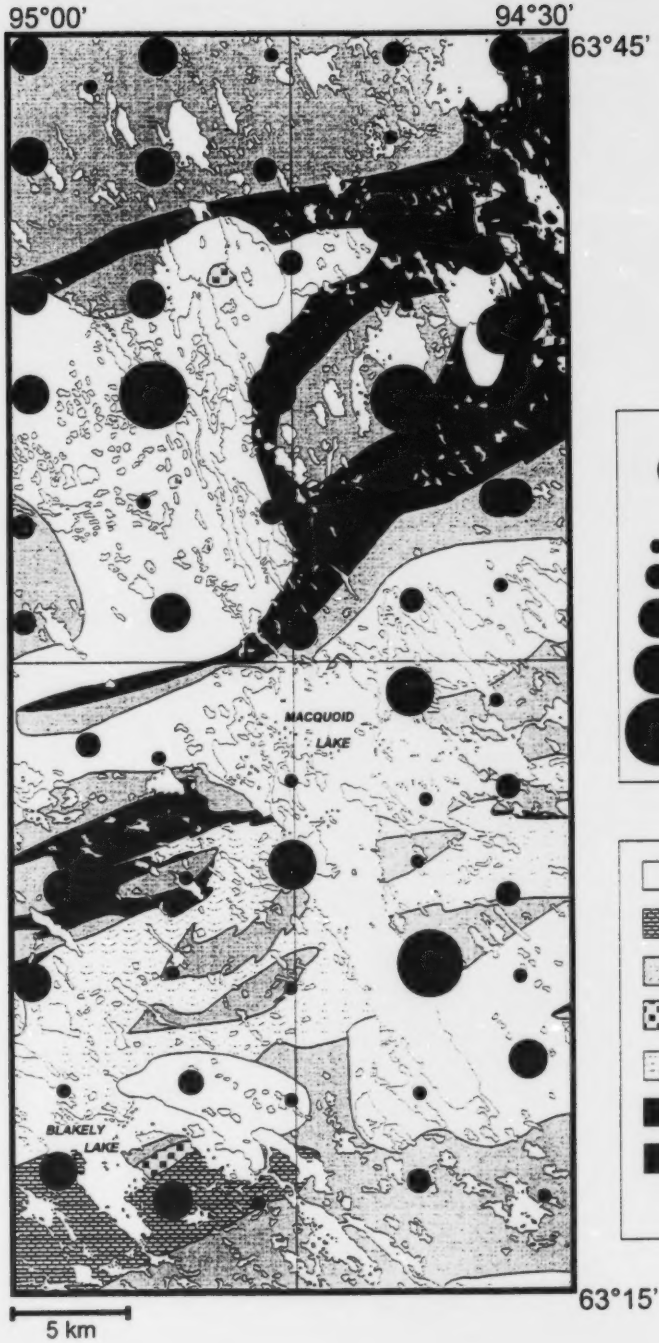
Generalized from Tella *et al.*, 1997b

Ni		
Till Geochemistry	Sample Preparation:	Dry sieve; <230 mesh screen
	Analytical Preparation:	Nitric-aqua regia partial leach
< 0.063 mm	Analytical Method:	ICP-AES
	Detection Limit:	1 ppm

Descriptive Statistics	
Mean	9.92
Standard Error	0.77
Median	9.00
Mode	9.00
Standard Deviation	6.12
Sample Variance	37.40
Kurtosis	33.30
Skewness	5.08
Range	48.00
Minimum	3.00
Maximum	51.00
Sum	625.00
Count	63
Maximum	51.00
99th percentile	30.54
98th percentile	18.00
95th percentile	16.90
90th percentile	13.00
75th percentile	10.00
Median	9.00
25th percentile	7.50
5th percentile	5.00
Minimum	3.00







Ni

Nickel (ppm)

(<0.063 mm fraction)

Nickel (ppm)
(<0.063 mm fraction)

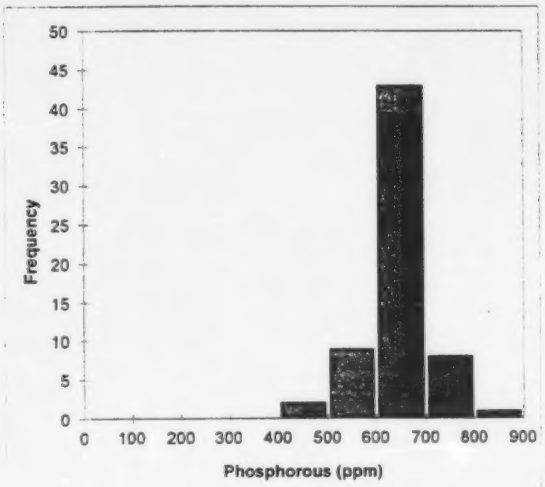
	Min	Max	%tile	# Samp
●	3	9	50th	24
●	9	10	75th	13
●	10	13	90th	18
●	13	18	98th	5
●	18	51	100th	3

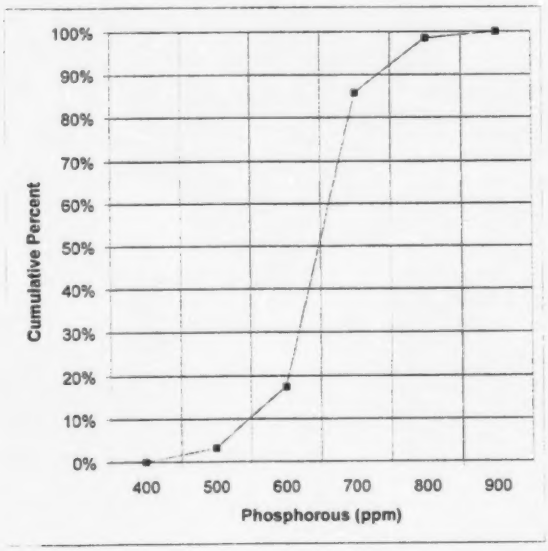
- Glacial Deposits
- Orthogneiss
- Granitoid Rocks; quartz diorite, granite
- Gabbro
- Metasedimentary Rocks
- Metavolcanic Rocks; basalt to andesite
- Metavolcanic Rocks; intermediate to felsic

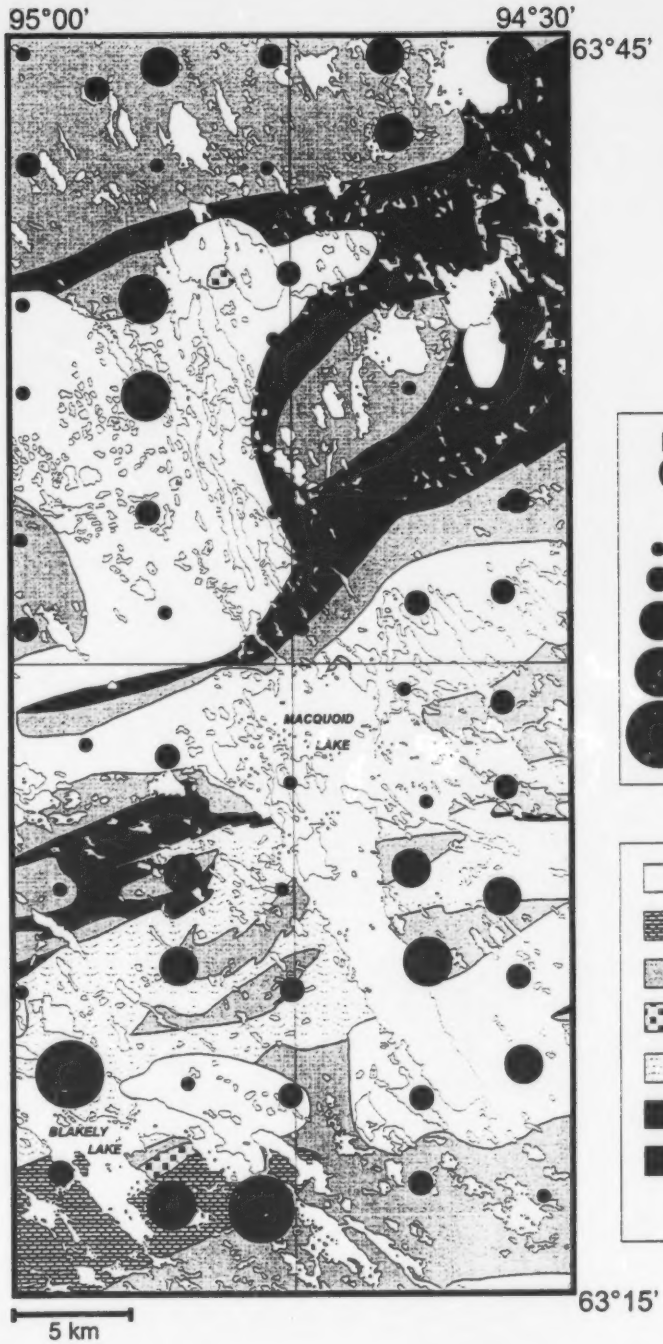
Generalized from Tella *et al.*, 1997b

P		
Till Geochemistry < 0.063 mm	Sample Preparation: Analytical Preparation: Analytical Method: Detection Limit:	Dry sieve; <230 mesh screen Nitric-aqua regia partial leach ICP-AES 10 ppm

Descriptive Statistics	
Mean	648.10
Standard Error	8.61
Median	640.00
Mode	650.00
Standard Deviation	68.36
Sample Variance	4673.73
Kurtosis	1.02
Skewness	0.14
Range	340.00
Minimum	480.00
Maximum	820.00
Sum	40830.00
Count	63
Maximum	820.00
99th percentile	807.60
98th percentile	797.60
95th percentile	788.00
90th percentile	744.00
75th percentile	680.00
Median	640.00
25th percentile	610.00
5th percentile	524.00
Minimum	480.00







P

Phosphorous (ppm)

(<0.063 mm fraction)

Phosphorous (ppm) (<0.063 mm fraction)

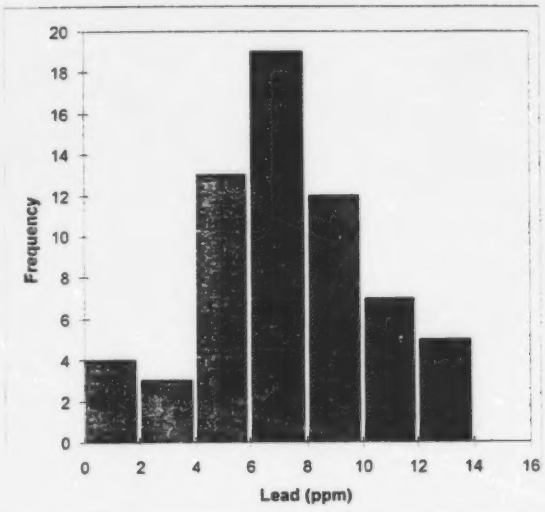
Min	Max	%tile	# Samp
480	640	50th	26
640	680	75th	20
680	744	90th	10
744	798	98th	5
798	820	100th	2

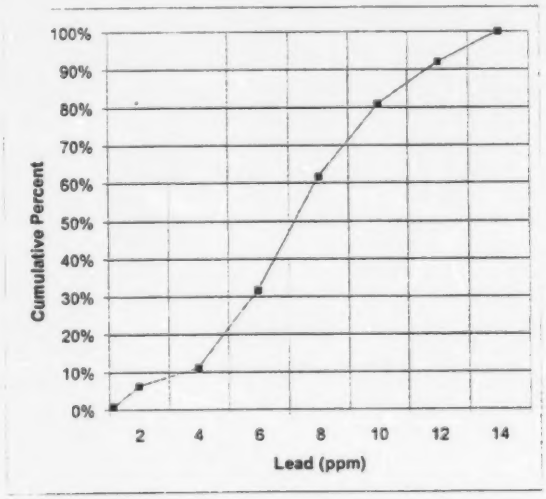
- Glacial Deposits
- Orthogneiss
- Granitoid Rocks; quartz diorite, granite
- Gabbro
- Metasedimentary Rocks
- Metavolcanic Rocks; basalt to andesite
- Metavolcanic Rocks; intermediate to felsic

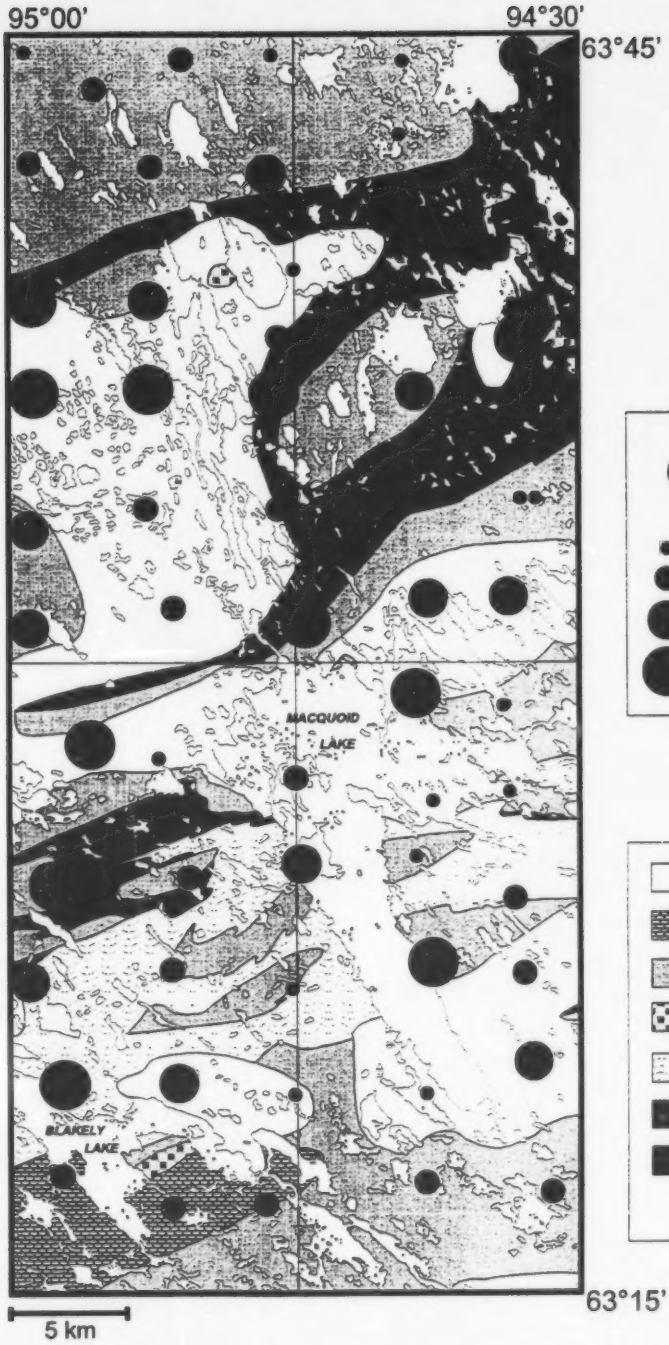
Generalized from Tella *et al.*, 1997b

Pb		
Till Geochemistry	Sample Preparation:	Dry sieve; <230 mesh screen
< 0.063 mm	Analytical Preparation:	Nitric-aqua regia partial leach
	Analytical Method:	ICP-AES
	Detection Limit:	2 ppm

Descriptive Statistics	
Mean	8.32
Standard Error	0.38
Median	8.00
Mode	8.00
Standard Deviation	3.05
Sample Variance	9.32
Kurtosis	-0.21
Skewness	-0.05
Range	12.00
Minimum	2.00
Maximum	14.00
Sum	524.00
Count	63
Maximum	14.00
99th percentile	14.00
98th percentile	14.00
95th percentile	14.00
90th percentile	12.00
75th percentile	10.00
Median	8.00
25th percentile	6.00
5th percentile	2.20
Minimum	2.00







Pb

Lead (ppm)

(<0.063 mm fraction)

Lead (ppm) (<0.063 mm fraction)

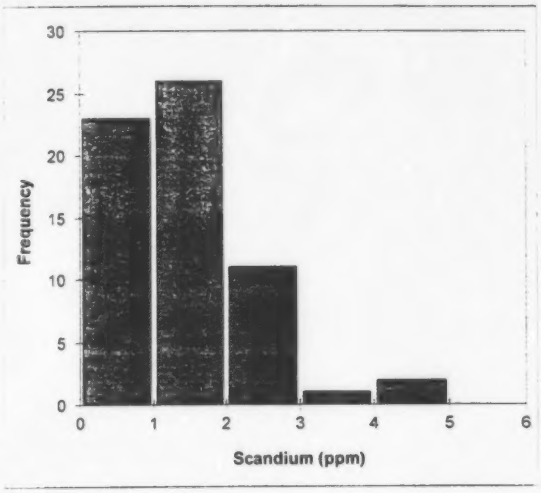
	Min	Max	%tile	# Samp
●	2	8	50th	20
●	8	10	75th	19
●	10	12	90th	12
●	12	14	100th	12

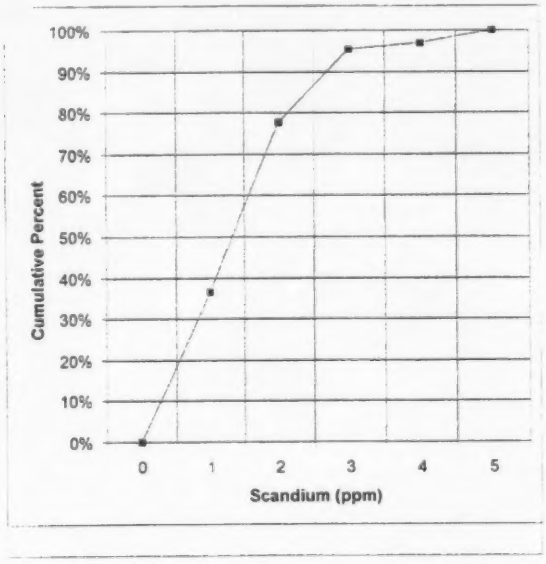
- Glacial Deposits
- Orthogneiss
- Granitoid Rocks; quartz diorite, granite
- Gabbro
- Metasedimentary Rocks
- Metavolcanic Rocks; basalt to andesite
- Metavolcanic Rocks; intermediate to felsic

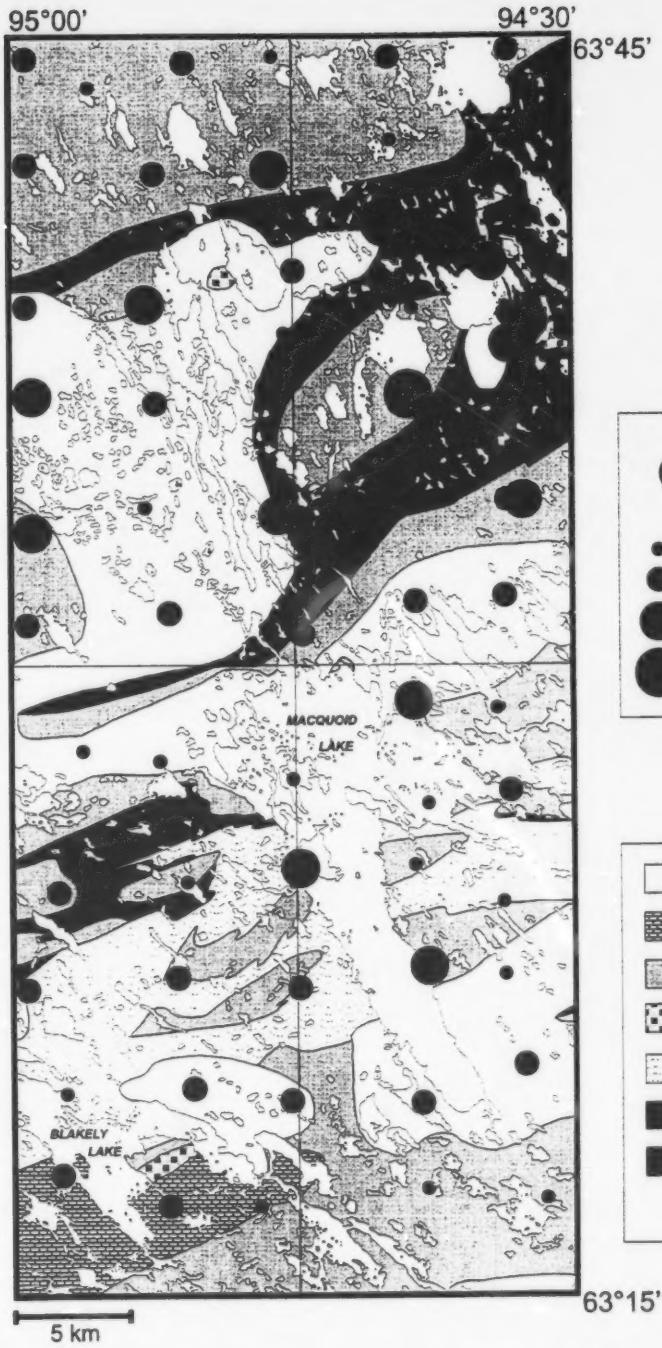
Generalized from Tella *et al.*, 1997b

Sc		
Till Geochemistry	Sample Preparation:	Dry sieve; <230 mesh screen
< 0.063 mm	Analytical Preparation:	Nitric-aqua regia partial leach
	Analytical Method:	ICP-AES
	Detection Limit:	1 ppm

Descriptive Statistics	
Mean	1.92
Standard Error	0.12
Median	2.00
Mode	2.00
Standard Deviation	0.97
Sample Variance	0.94
Kurtosis	1.64
Skewness	1.09
Range	4.50
Minimum	0.50
Maximum	5.00
Sum	121.00
Count	63
Maximum	5.00
99th percentile	5.00
98th percentile	4.76
95th percentile	3.00
90th percentile	3.00
75th percentile	2.00
Median	2.00
25th percentile	1.00
5th percentile	1.00
Minimum	0.50







Sc

Scandium (ppm)

(<0.063 mm fraction)

Scandium (ppm)
(<0.063 mm fraction)

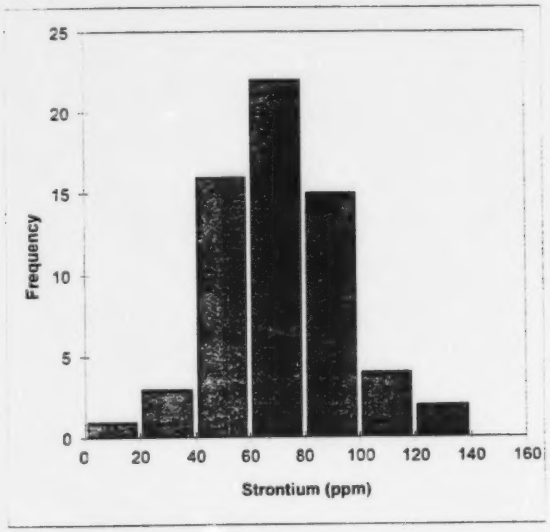
	Min	Max	%tile	# Samp
●	0.5	2	50th	23
●	2	3	90th	26
●	3	4.8	98th	12
●	4.8	5	100th	2

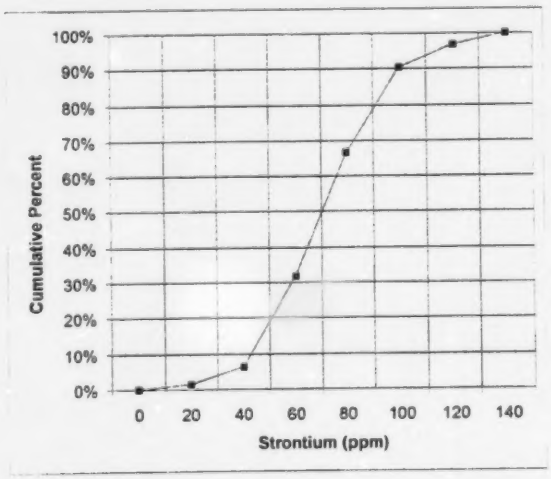
- Glacial Deposits
- Orthogneiss
- Granitoid Rocks; quartz diorite, granite
- Gabbro
- Metasedimentary Rocks
- Metavolcanic Rocks; basalt to andesite
- Metavolcanic Rocks; intermediate to felsic

Generalized from Tella *et al.*, 1997b

Sr		
Till Geochemistry	Sample Preparation:	Dry sieve; <230 mesh screen
< 0.063 mm	Analytical Preparation:	Nitric-aqua regia partial leach
	Analytical Method:	ICP-AES
	Detection Limit:	1 ppm

Descriptive Statistics	
Mean	71.63
Standard Error	2.79
Median	69.00
Mode	68.00
Standard Deviation	22.16
Sample Variance	490.88
Kurtosis	0.19
Skewness	0.24
Range	109.00
Minimum	18.00
Maximum	127.00
Sum	4513.00
Count	63
Maximum	127.00
99th percentile	123.90
98th percentile	121.52
95th percentile	107.60
90th percentile	99.40
75th percentile	85.00
Median	69.00
25th percentile	56.50
5th percentile	40.20
Minimum	18.00

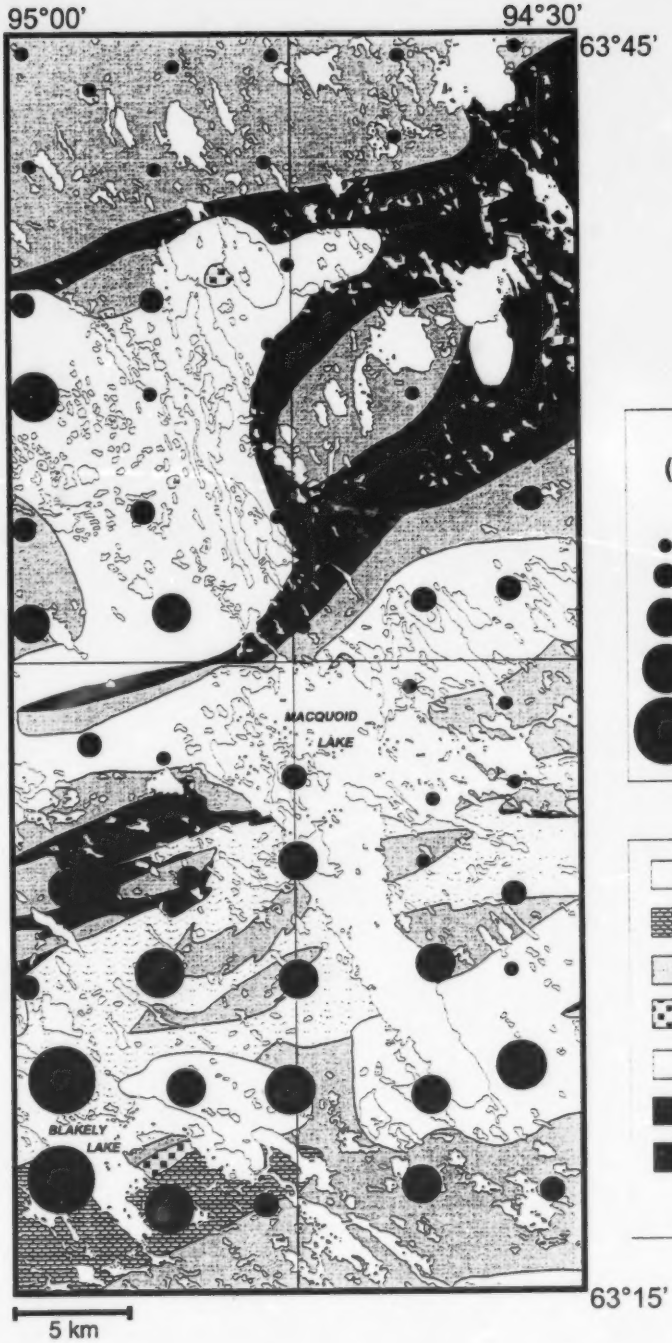




Sr

Strontium (ppm)

(<0.063 mm fraction)



Strontium (ppm)
(<0.063 mm fraction)

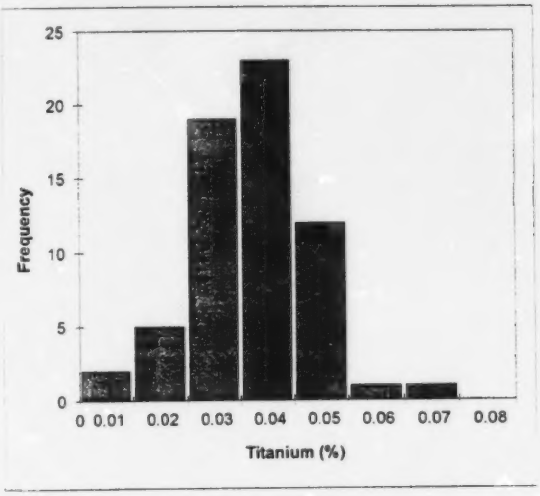
	Min	Max	%tile	# Samp
●	18	69	50th	30
●	69	85	75th	16
●	85	99	90th	10
●	99	122	98th	5
●	122	127	100th	2

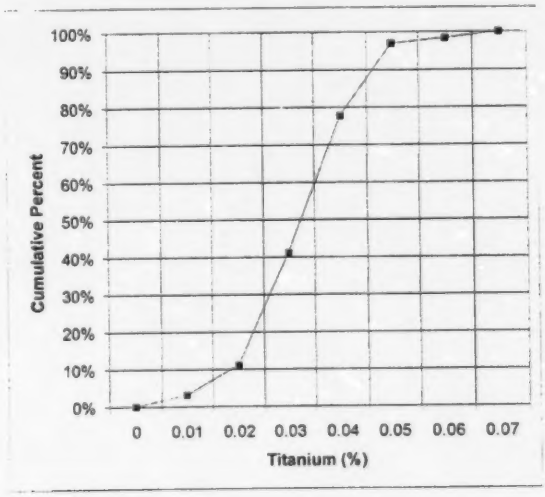
- Glacial Deposits
- Orthogneiss
- Granitoid Rocks; quartz diorite, granite
- Gabbro
- Metasedimentary Rocks
- Metavolcanic Rocks; basalt to andesite
- Metavolcanic Rocks; intermediate to felsic

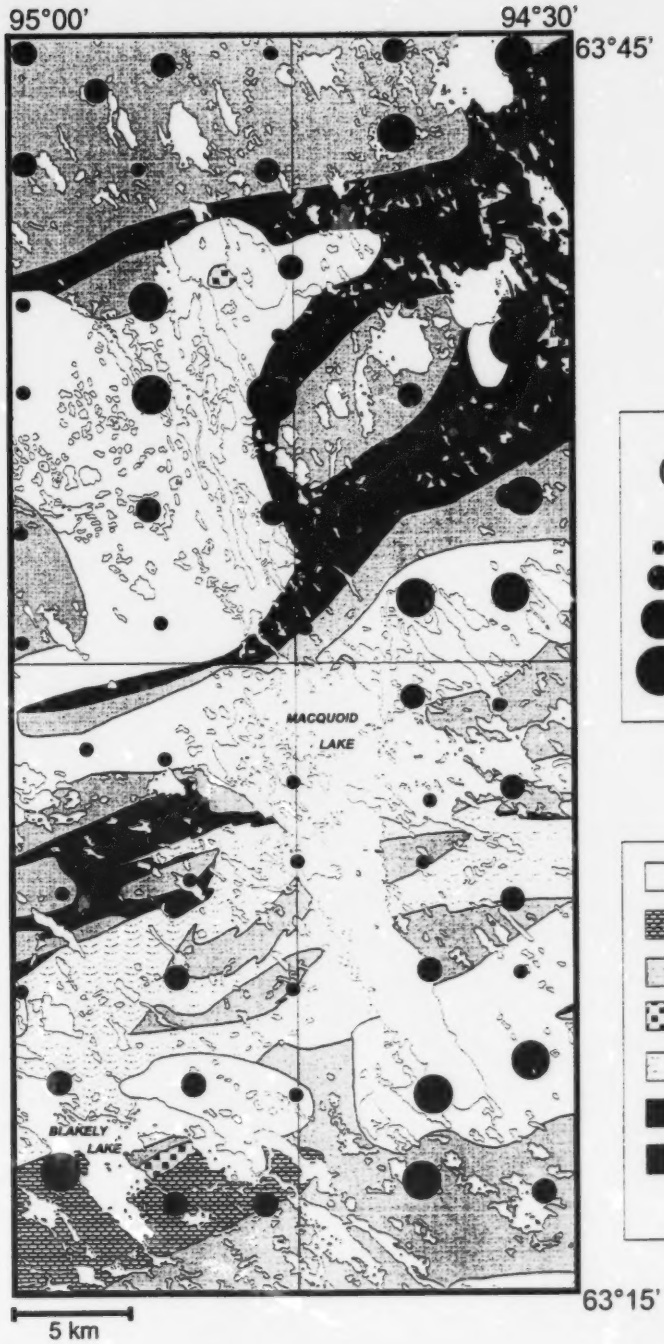
Generalized from Tella *et al.*, 1997b

Ti		
Till Geochemistry	Sample Preparation:	Dry sieve; <230 mesh screen
< 0.063 mm	Analytical Preparation:	Nitric-aqua regia partial leach
	Analytical Method:	ICP-AES
	Detection Limit:	0.01%

Descriptive Statistics	
Mean	0.04
Standard Error	0.00
Median	0.04
Mode	0.04
Standard Deviation	0.01
Sample Variance	0.00
Kurtosis	0.71
Skewness	0.02
Range	0.06
Minimum	0.01
Maximum	0.07
Sum	2.34
Count	63
Maximum	0.07
99th percentile	0.06
98th percentile	0.06
95th percentile	0.05
90th percentile	0.05
75th percentile	0.04
Median	0.04
25th percentile	0.03
5th percentile	0.02
Minimum	0.01







Ti

Titanium (%)

(<0.063 mm fraction)

Titanium (%)
(<0.063 mm fraction)

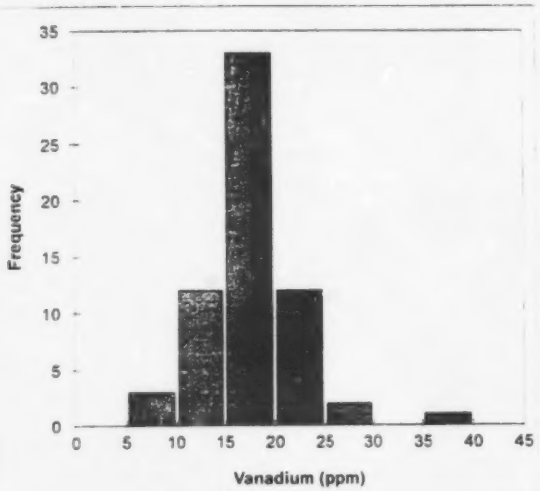
	Min	Max	%tile	# Samp
●	0.01	0.04	50th	26
●	0.04	0.05	90th	23
●	0.05	0.06	98th	12
●	0.06	0.07	100th	2

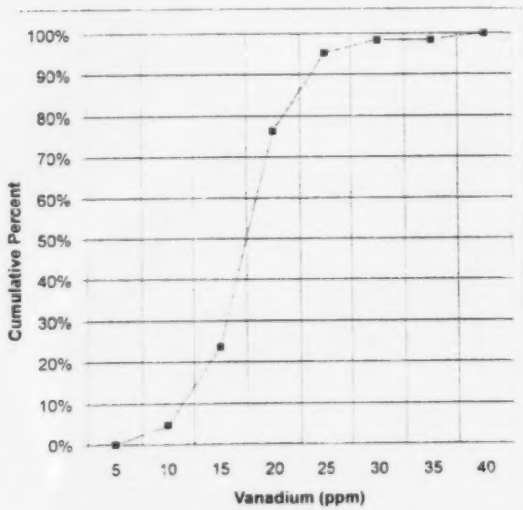
- Glacial Deposits
- Orthogneiss
- Granitoid Rocks; quartz diorite, granite
- Gabbro
- Metasedimentary Rocks
- Metavolcanic Rocks; basalt to andesite
- Metavolcanic Rocks; intermediate to felsic

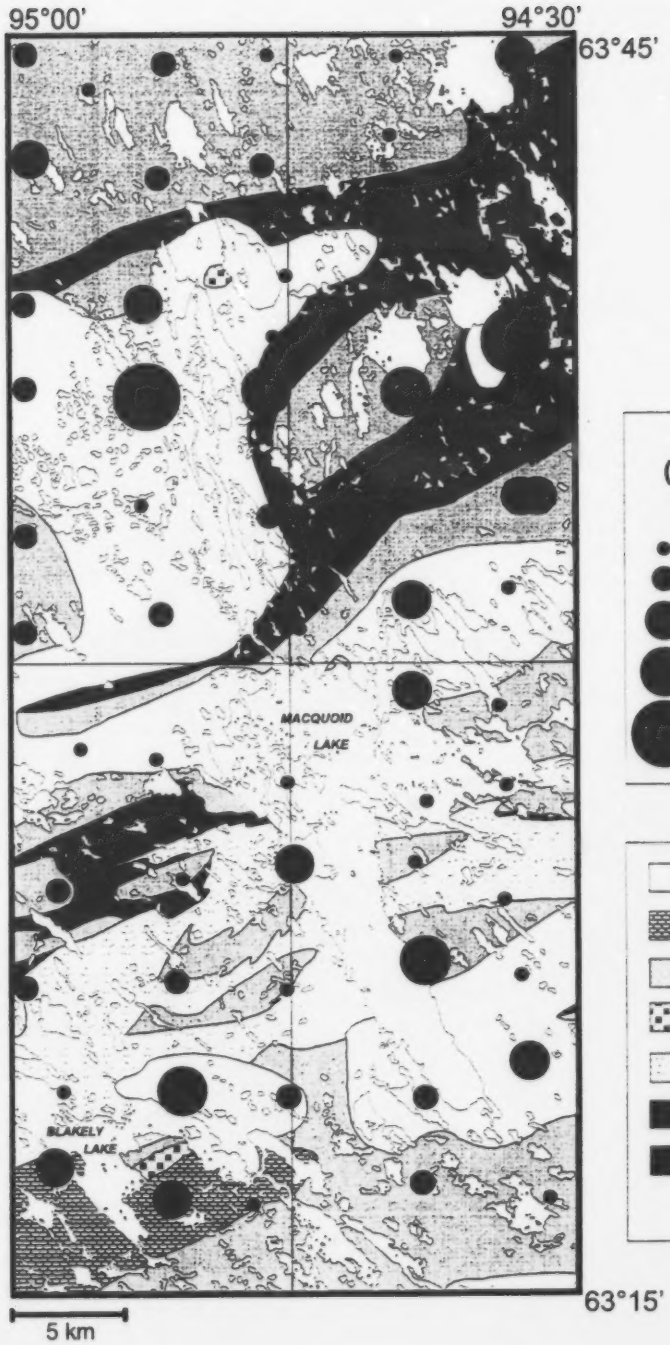
Generalized from Tella *et al.*, 1997b

V		
	Sample Preparation:	Dry sieve; <230 mesh screen
	Analytical Preparation:	Nitric-aqua regia partial leach
Till Geochemistry	Analytical Method:	ICP-AES
< 0.063 mm	Detection Limit:	1 ppm

Descriptive Statistics	
Mean	18.22
Standard Error	0.60
Median	18.00
Mode	18.00
Standard Deviation	4.73
Sample Variance	22.34
Kurtosis	5.29
Skewness	1.45
Range	30.00
Minimum	9.00
Maximum	39.00
Sum	1148.00
Count	63
Maximum	39.00
99th percentile	32.80
98th percentile	28.76
95th percentile	24.90
90th percentile	22.80
75th percentile	20.00
Median	18.00
25th percentile	16.00
5th percentile	12.10
Minimum	9.00







V

Vanadium (ppm)

(<0.063 mm fraction)

Vanadium (ppm)
(<0.063 mm fraction)

	Min	Max	%tile	# Samp
●	9	18	50th	28
●	18	20	75th	16
●	20	23	90th	12
●	23	29	98th	5
●	29	39	100th	2

- Glacial Deposits
- Orthogneiss
- Granitoid Rocks; quartz diorite, granite
- Gabbro
- Metasedimentary Rocks
- Metavolcanic Rocks; basalt to andesite
- Metavolcanic Rocks; intermediate to felsic

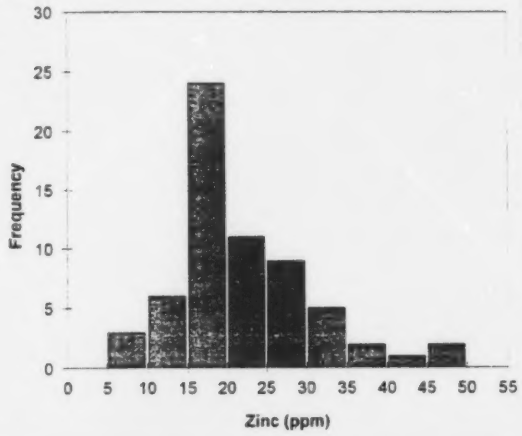
Generalized from Tella *et al.*, 1997b

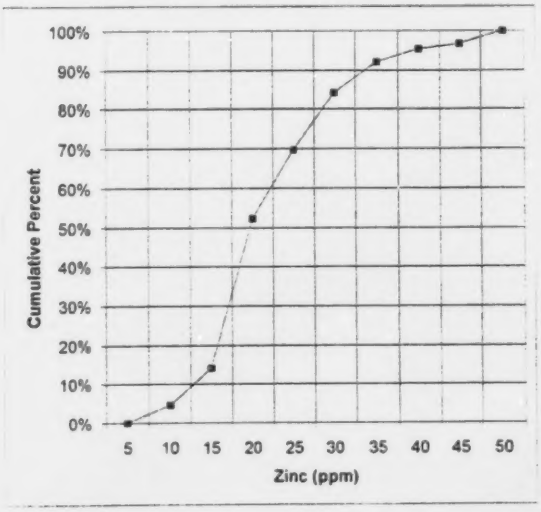
Zn

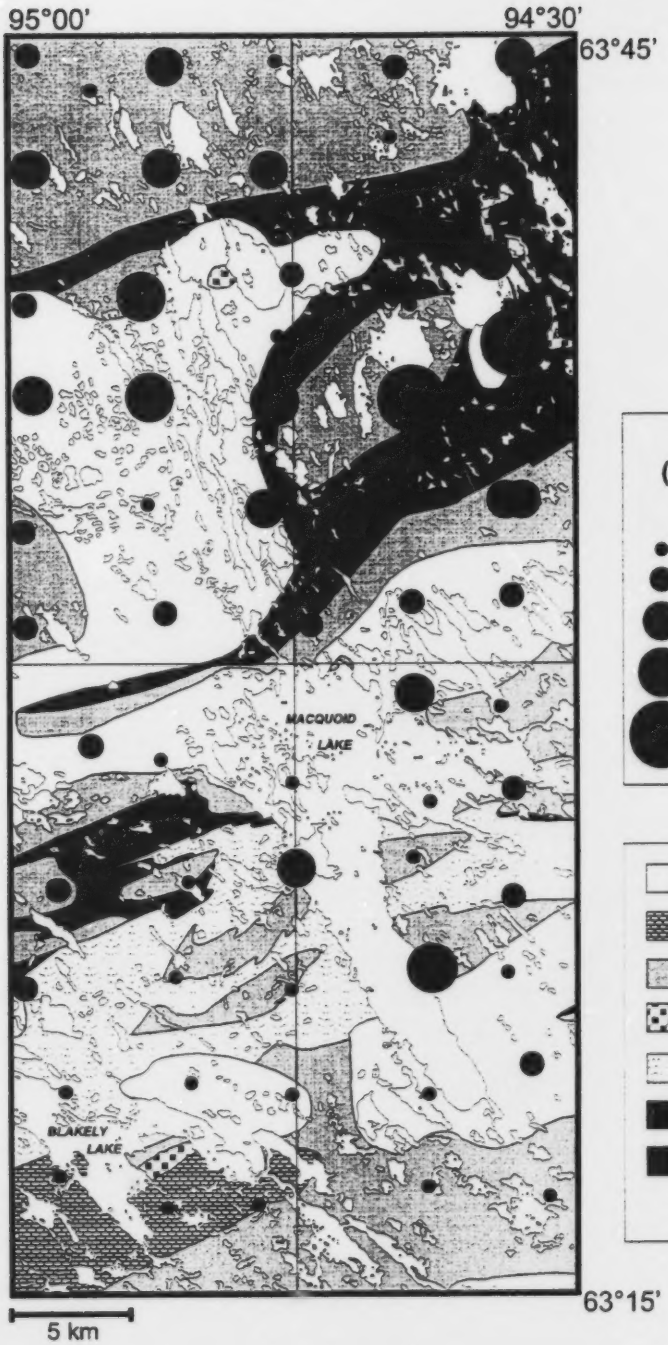
Till Geochemistry
< 0.063 mm

Sample Preparation:	Dry sieve; <230 mesh screen
Analytical Preparation:	Nitric-aqua regia partial leach
Analytical Method:	ICP-AES
Detection Limit:	2 ppm

Descriptive Statistics	
Mean	22.29
Standard Error	1.10
Median	20.00
Mode	16.00
Standard Deviation	8.77
Sample Variance	76.88
Kurtosis	0.99
Skewness	0.96
Range	42.00
Minimum	6.00
Maximum	48.00
Sum	1404.00
Count	63
Maximum	48.00
99th percentile	46.76
98th percentile	45.52
95th percentile	39.60
90th percentile	33.60
75th percentile	26.00
Median	20.00
25th percentile	16.00
5th percentile	12.00
Minimum	6.00







Zn

Zinc (ppm)

(<0.063 mm fraction)

Zinc (ppm)
(<0.063 mm fraction)

	Min	Max	%tile	# Samp
●	6	20	50th	28
●	20	26	75th	16
●	26	34	90th	12
●	34	46	98th	5
●	46	48	100th	2

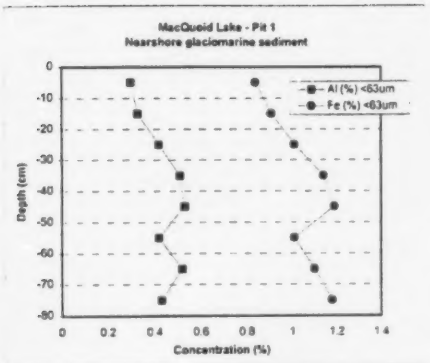
- Glacial Deposits
- Orthogneiss
- Granitoid Rocks; quartz diorite, granite
- Gabbro
- Metasedimentary Rocks
- Metavolcanic Rocks; basalt to andesite
- Metavolcanic Rocks; intermediate to felsic

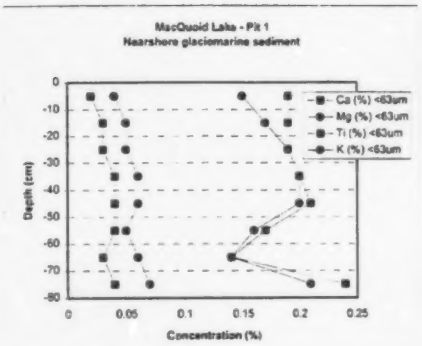
Generalized from Tella *et al.*, 1997b

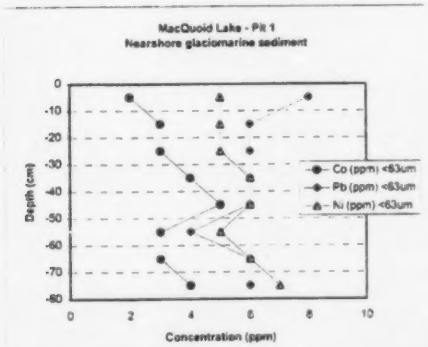
Appendix 12:

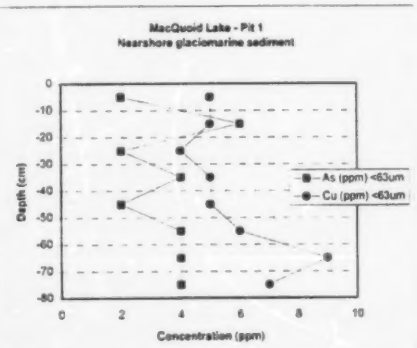
Soil Profiles
Geochemical Plots and Correlation Matrices

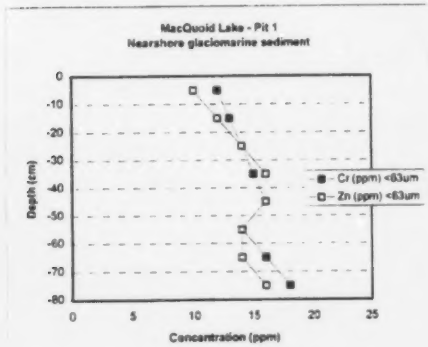
Pit 1 (<0.063 mm fraction)

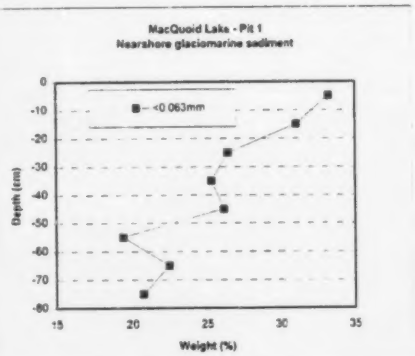


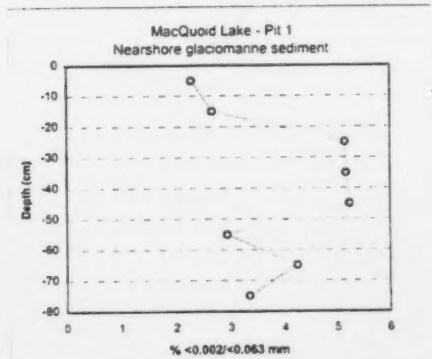


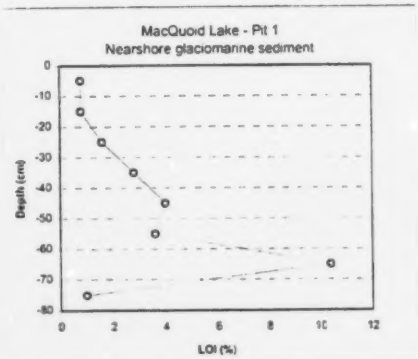








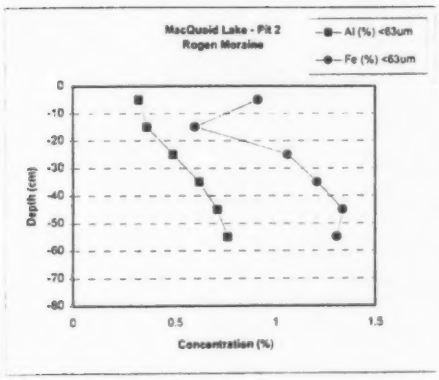


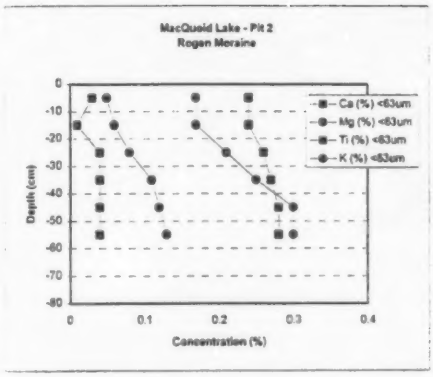


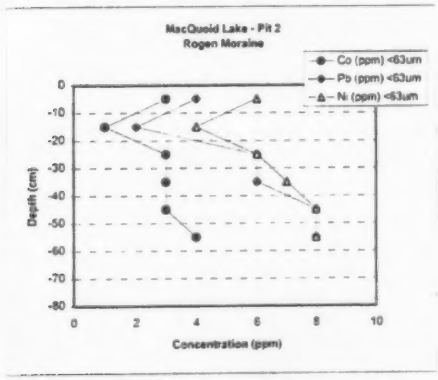
Pit 1 (<0.063mm fraction) (n = 8)

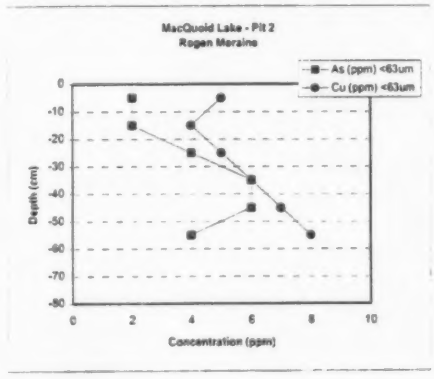
Variable	Depth (cm)	Al (%)	As (ppm)	Ba (ppm)	Ca (%)	Co (ppm)	Cr (ppm)	Cu (ppm)	Fe (%)	K (%)	Mg (%)	Mn (ppm)	Ni (ppm)	P (ppm)	Pb (ppm)	Sr (ppm)	Ti (%)	V (ppm)	Zn (ppm)	% LOI	2-0.063mm	0.063-0.002mm	< 0.002mm	<0.63mm	0.002/0.063%
Depth (cm)	1.00																								
Al (%) <63um	-0.64	1.00																							
As (ppm) <63um	-0.16	-0.13	1.00																						
Ba (ppm) <63um	-0.75	0.82	-0.02	1.00																					
Ca (%) <63um	0.05	-0.09	-0.12	-0.45	1.00																				
Co (ppm) <63um	-0.48	0.73	-0.06	0.33	0.52	1.00																			
Cr (ppm) <63um	-0.89	0.70	0.05	0.84	0.37	0.71	1.00																		
Cu (ppm) <63um	-0.74	0.38	0.32	0.78	-0.40	-0.02	0.54	1.00																	
Fe (%) <63um	-0.77	0.89	-0.06	0.65	0.33	0.88	0.92	0.34	1.00																
K (%) <63um	-0.82	0.70	0.22	0.58	0.40	0.76	0.97	0.49	0.92	1.00															
Mg (%) <63um	0.20	0.32	-0.12	-0.16	0.86	0.76	0.53	-0.40	0.63	0.50	1.00														
Mn (ppm) <63um	-0.23	0.61	-0.27	0.08	0.58	0.88	0.48	0.38	0.73	0.52	0.85	1.00													
Ni (ppm) <63um	-0.74	0.58	0.07	0.50	0.49	0.65	0.93	0.52	0.83	0.93	0.53	0.43	1.00												
P (ppm) <63um	0.02	-0.09	-0.21	-0.44	0.98	0.46	0.34	-0.41	0.30	0.36	0.84	0.55	0.49	1.00											
Pb (ppm) <63um	0.55	-0.37	-0.38	-0.32	0.18	-0.29	-0.28	-0.17	0.36	-0.29	0.10	0.28	0.00	0.32	1.00										
Sr (ppm) <63um	-0.18	0.49	-0.20	-0.02	0.77	0.89	0.53	-0.36	0.71	0.60	0.94	0.94	0.56	0.75	-0.03	1.00									
Ti (%)<63um	-0.87	0.65	0.20	0.33	0.37	0.81	0.88	0.09	0.81	0.73	0.84	0.77	0.55	0.26	-0.72	0.66	1.00								
V (ppm) <63um	-0.65	0.73	-0.08	0.39	0.60	0.94	0.86	0.11	0.95	0.88	0.81	0.85	0.82	0.55	-0.29	0.87	0.84	1.00							
Zn (ppm) <63um	-0.71	0.84	0.00	0.53	0.37	0.88	0.84	0.17	0.98	0.87	0.72	0.81	0.72	0.32	-0.50	0.75	0.90	0.94	1.00						
% LOI	0.52	0.66	0.04	0.93	-0.72	0.08	0.34	0.76	0.36	0.28	-0.47	-0.17	0.21	-0.71	-0.23	-0.30	0.07	0.08	0.23	1.00					
2mm-0.063mm	0.92	0.60	0.15	0.65	-0.05	0.38	0.71	0.55	0.68	0.65	0.19	0.29	0.50	-0.13	-0.77	0.13	0.74	0.55	0.71	0.43	1.00				
0.063mm-0.002mm	0.91	-0.65	-0.12	-0.67	0.04	0.42	0.73	0.53	0.71	0.67	0.22	0.33	0.51	0.12	0.77	-0.17	-0.78	-0.58	-0.74	-0.44	-1.00	1.00			
< 0.002mm	0.20	0.55	-0.44	0.17	0.10	0.50	0.12	-0.41	0.40	0.16	0.46	0.62	0.07	0.16	0.16	0.59	0.14	0.37	0.42	0.10	-0.18	0.11	1.00		
<0.063mm	0.92	-0.60	-0.15	-0.65	0.05	-0.38	-0.71	-0.55	-0.68	-0.65	0.19	0.29	-0.50	0.13	0.77	-0.13	-0.74	-0.55	-0.71	-0.43	-1.00	1.00	0.18	1.00	
%<0.002/0.063	-0.21	0.81	-0.37	0.48	0.05	0.65	0.43	-0.14	0.68	0.45	0.51	0.71	0.31	0.11	-0.14	0.62	0.44	0.60	0.71	0.32	0.25	-0.31	0.91	-0.25	1.00

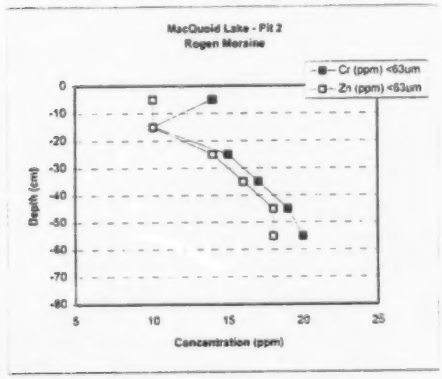
Pit 2 (<0.063 mm fraction)

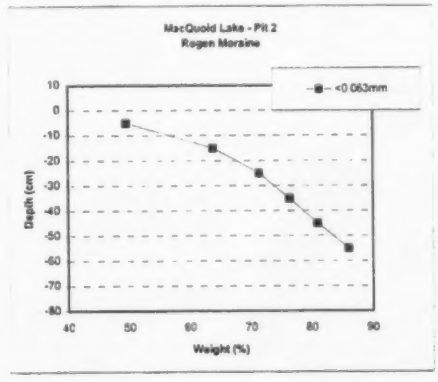


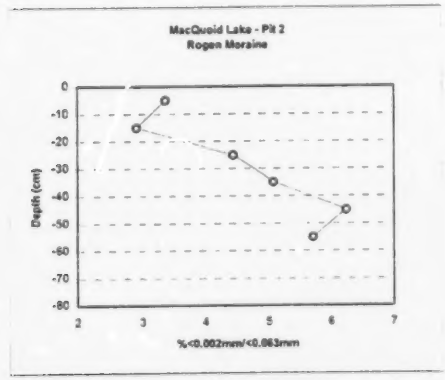


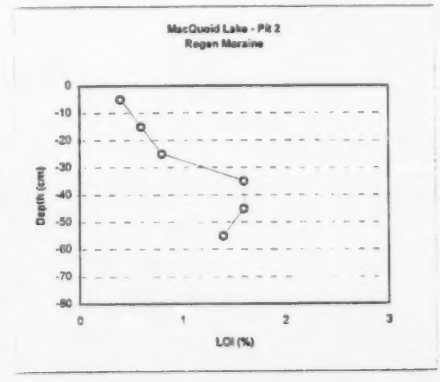




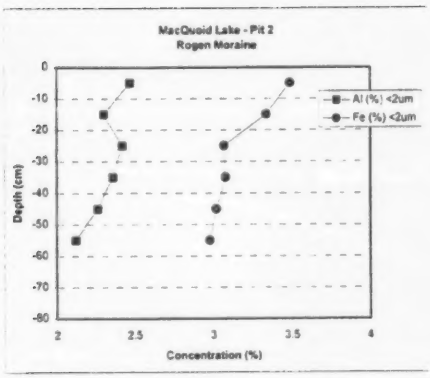


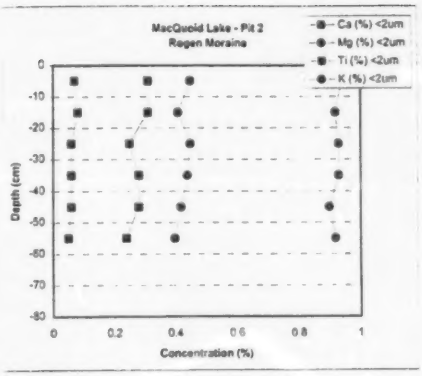


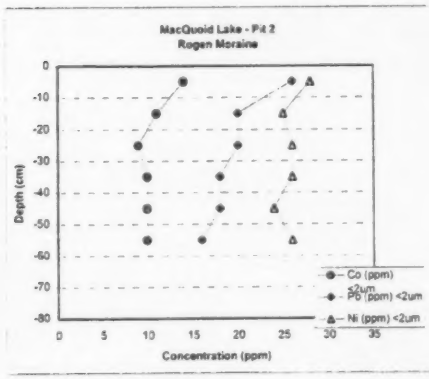


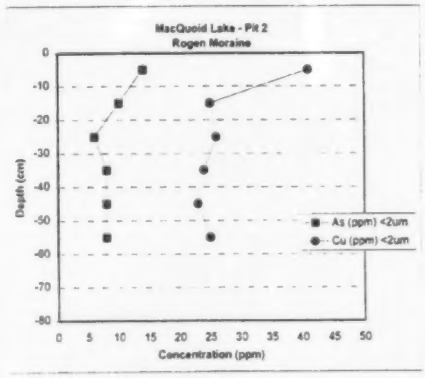


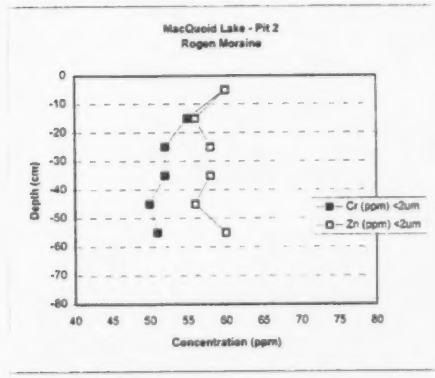
Pit 2 (<0.002 mm fraction)

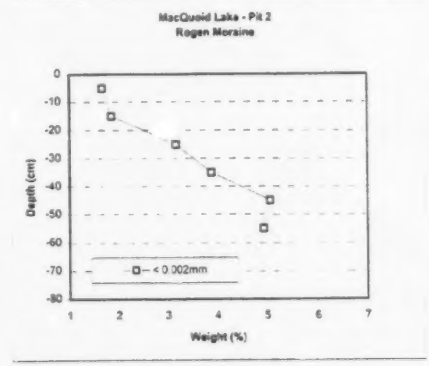


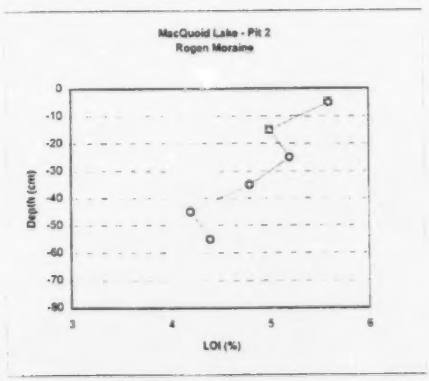












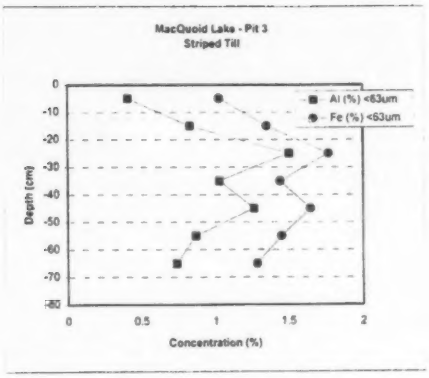
Pit 2 (<0.063mm fraction) (n = 6)

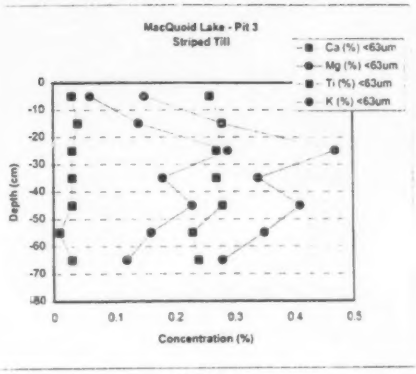
Variables	Depth (cm)	Al (%)	As (ppm)	Ba (ppm)	Ca (%)	Co (ppm)	Cr (ppm)	Cu (ppm)	Fe (%)	K (%)	Mg (%)	Mn (ppm)	Ni (ppm)	P (ppm)	Pb (ppm)	Sr (ppm)	Ti (%)	V (ppm)	Zn (ppm)	% LOI	2 - 0.063mm	0.063 - 0.002mm	< 0.002mm	<0.063mm	%<0.002/<0.063
Depth (cm)	1 00																								
Al (%) <63um	-0 99	1 00																							
As (ppm) <63um	-0 72	0 80	1 00																						
Ba (ppm) <63um	-0 98	1 00	0 79	1 00																					
Ca (%) <63um	-0 98	0 99	0 85	0 99	1 00																				
Co (ppm) <63um	-0 80	0 65	0 45	0 70	0 68	1 00																			
Cr (ppm) <63um	-0 86	0 91	0 73	0 94	0 93	0 88	1 00																		
Cu (ppm) <63um	-0 91	0 92	0 61	0 95	0 90	0 81	0 96	1 00																	
Fe (%) <63um	-0 83	0 89	0 83	0 91	0 94	0 85	0 98	0 90	1 00																
K (%) <63um	-0 98	1 00	0 81	0 98	0 98	0 62	0 89	0 91	0 86	1 00															
Mg (%) <63um	-0 97	0 99	0 79	0 99	0 98	0 66	0 93	0 94	0 91	0 98	1 00														
Mn (ppm) <63um	-0 75	0 81	0 68	0 84	0 84	0 85	0 97	0 91	0 95	0 79	0 87	1 00													
Ni (ppm) <63um	-0 81	0 87	0 74	0 90	0 90	0 87	0 99	0 94	0 98	0 86	0 91	0 99	1 00												
P (ppm) <63um	-0 41	0 33	0 32	0 26	0 31	-0 39	-0 05	0 00	-0 01	0 35	0 27	0 19	0 13	1 00											
Pb (ppm) <63um	-0 87	0 91	0 77	0 92	0 95	0 84	0 97	0 91	0 98	0 89	0 83	0 93	0 96	0 06	1 00										
Sr (ppm) <63um	-0 97	0 97	0 85	0 96	0 97	0 53	0 82	0 82	0 84	0 98	0 95	0 70	0 78	0 50	0 80	1 00									
Ti (%) <63um	-0 62	0 70	0 74	0 73	0 78	0 90	0 87	0 71	0 92	0 68	0 70	0 84	0 87	-0 16	0 89	0 66	1 00								
V (ppm) <63um	-0 82	0 89	0 83	0 91	0 93	0 87	0 98	0 89	1 00	0 87	0 90	0 94	0 97	-0 03	0 97	0 83	0 94	1 00							
Zn (ppm) <63um	-0 95	0 99	0 85	0 99	1 00	0 68	0 93	0 90	0 94	0 98	0 98	0 84	0 90	0 31	0 95	0 97	0 78	0 93	1 00						
% LOI (<63um)	-0 88	0 93	0 93	0 92	0 93	0 48	0 81	0 78	0 84	0 95	0 91	0 73	0 79	0 36	0 79	0 94	0 84	0 83	0 93	1 00					
2mm-0.063mm	0 97	-0 95	-0 75	-0 93	-0 93	-0 46	-0 75	-0 78	-0 75	-0 95	-0 91	-0 81	-0 69	-0 59	-0 80	-0 98	-0 56	-0 74	-0 93	-0 88	1 00				
0.063mm-0.002mm	-0 96	0 94	0 73	0 91	0 91	0 43	0 73	0 76	0 72	0 94	0 89	0 57	0 66	0 62	0 77	0 98	0 53	0 71	0 91	0 87	-1 00	1 00			
< 0.002mm	-0 97	0 99	0 83	0 98	0 99	0 64	0 92	0 91	0 91	0 98	0 99	0 84	0 89	0 34	0 94	0 97	0 73	0 90	0 99	0 92	-0 93	0 92	1 00		
<0.063mm	-0 97	0 95	0 75	0 93	0 93	0 46	0 75	0 78	0 75	0 95	0 91	0 61	0 69	0 59	0 80	0 98	0 56	0 74	0 93	0 88	-1 00	1 00	0 93	1 00	
%<0.002/0.063	-0 91	0 96	0 86	0 96	0 98	0 70	0 95	0 90	0 96	0 94	0 98	0 91	0 94	0 22	0 97	0 93	0 81	0 95	0 98	0 91	-0 86	0 84	0 98	0 86	1 00

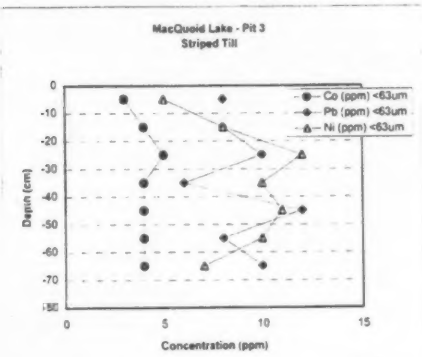
Pit 2 (<0.002mm fraction)

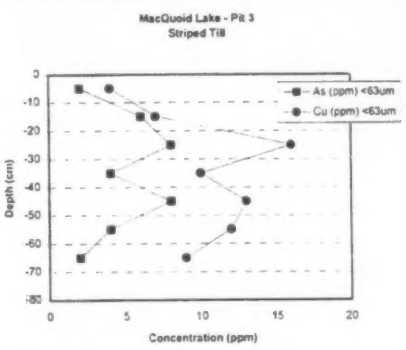
Variable	Depth (cm)	Al (%)	As (ppm)	Ba (ppm)	Ca (%)	Co (ppm)	Cr (ppm)	Cu (ppm)	Fe (%)	K (%)	Mg (%)	Mn (ppm)	Ni (ppm)	P (ppm)	Pb (ppm)	Sr (ppm)	Ti (%)	V (ppm)	Zn (ppm)	% LOI	2 - 0.063mm	0.063 - 0.002mm	< 0.002mm	<0.063mm
Depth (cm)	1 00																							
Al (%) <2um	0 83	1 00																						
As (ppm) <2um	0 66	0 38	1 00																					
Ba (ppm) <2um	0 09	0 51	0 12	1 00																				
Ca (%) <2um	0 75	0 49	0 77	0 24	1 00																			
Co (ppm) <2um	0 67	0 43	0 99	0 16	0 73	1 00																		
Cr (ppm) <2um	0 87	0 63	0 91	0 06	0 71	0 92	1 00																	
Cu (ppm) <2um	0 69	0 60	0 86	0 18	0 48	0 91	0 91	1 00																
Fe (%) <2um	0 92	0 61	0 89	0 02	0 85	0 68	0 97	0 80	1 00															
K (%) <2um	0 58	0 93	0 17	0 64	0 19	0 25	0 42	0 52	0 33	1 00														
Mg (%) <2um	0 63	0 65	0 42	0 16	0 17	0 47	0 69	0 68	0 55	0 64	1 00													
Mn (ppm) <2um	0 65	0 53	0 89	0 47	0 82	0 88	0 82	0 73	0 81	0 36	0 51	1 00												
Ni (ppm) <2um	0 52	0 53	0 60	0 17	0 15	0 66	0 75	0 65	0 56	0 55	0 92	0 58	1 00											
P (ppm) <2um	0 77	0 62	0 94	0 24	0 67	0 97	0 95	0 97	0 89	0 48	0 60	0 84	0 75	1 00										
Pb (ppm) <2um	0 90	0 81	0 80	0 22	0 67	0 84	0 93	0 91	0 90	0 64	0 62	0 72	0 68	0 94	1 00									
Sr (ppm) <2um	0 82	0 65	0 58	0 26	0 94	0 55	0 63	0 38	0 79	0 35	0 18	0 67	0 06	0 56	0 67	1 00								
Ti (%) <2um	0 83	0 48	0 56	-0 11	0 88	0 52	0 65	0 32	0 82	0 12	0 19	0 55	0 05	0 49	0 60	0 93	1 00							
V (ppm) <2um	0 97	0 70	0 80	0 00	0 81	0 80	0 94	0 76	0 98	0 42	0 56	0 72	0 53	0 84	0 92	0 82	0 85	1 00						
Zn (ppm) <2um	0 00	0 05	0 32	0 00	-0 31	0 38	0 37	0 59	0 12	0 21	0 65	0 23	0 84	0 43	0 26	-0 46	-0 43	0 04	1 00					
% LOI (<2um)	0 91	0 84	0 56	0 09	0 46	0 80	0 85	0 77	0 80	0 70	0 87	0 56	0 78	0 75	0 87	0 54	0 55	0 85	0 35	1 00				
2mm-0.063mm	0 78	0 80	0 12	0 76	0 82	0 96	0 84	0 97	0 55	0 64	0 75	0 65	0 63	0 90	0 97	0 77	0 76	0 98	0 16	0 90	1 00			
0.063mm-0.002mm	-0 79	-0 82	0 14	-0 76	-0 84	-0 95	-0 85	-0 96	-0 56	-0 64	-0 76	-0 87	-0 64	-0 91	-0 97	-0 77	-0 74	-0 98	-0 17	-0 89	-1 00	1 00		
< 0.002mm	-0 70	-0 65	0 10	-0 71	-0 65	-0 88	-0 65	-0 92	-0 42	-0 66	-0 62	-0 66	-0 54	-0 71	-0 82	-0 76	-0 84	-0 96	-0 05	-0 90	-0 93	0 92	1 00	
<0.063mm	-0 78	-0 80	-0 12	-0 78	-0 82	-0 96	-0 84	-0 97	-0 55	-0 64	-0 75	-0 85	-0 63	-0 90	-0 97	-0 77	-0 78	-0 98	-0 16	-0 90	-1 00	1 00	0 93	1 00

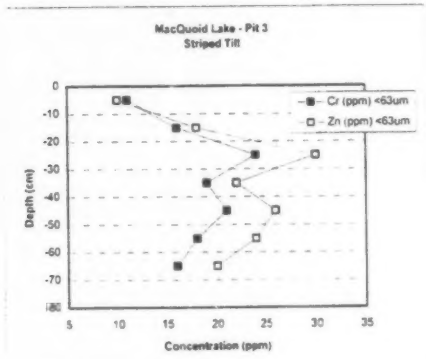
Pit 3 (<0.063 mm fraction)

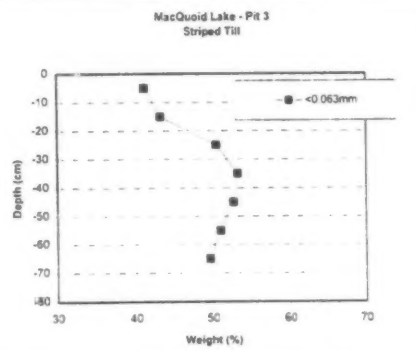


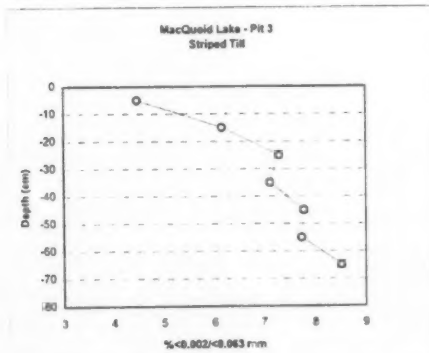


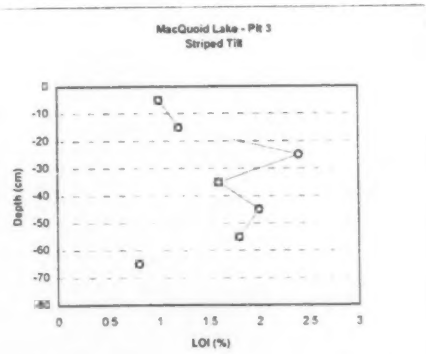




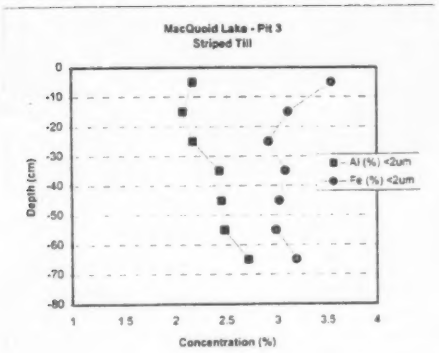


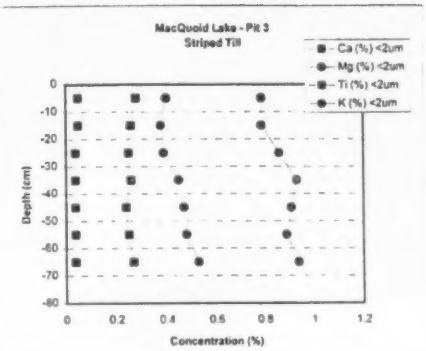


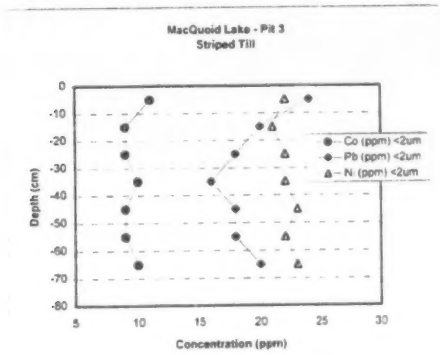


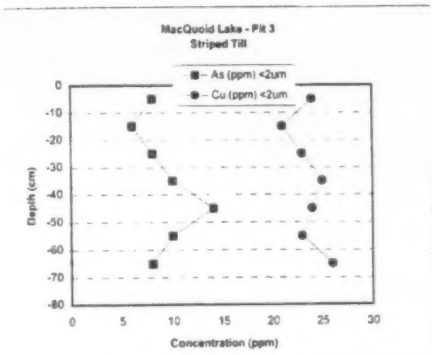


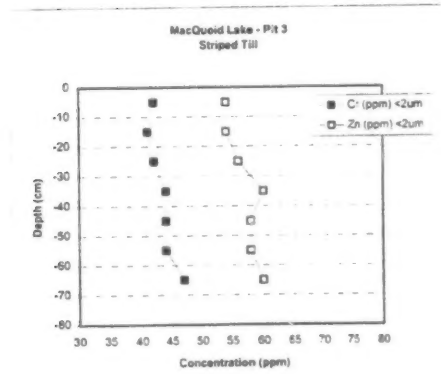
Pit 3 (<0.002 mm fraction)

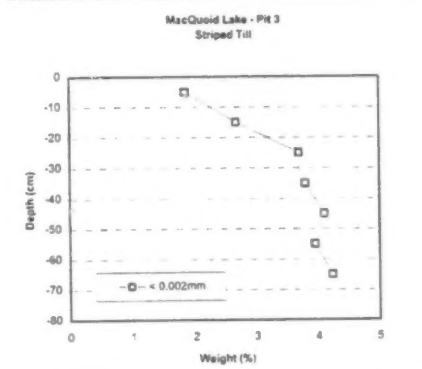


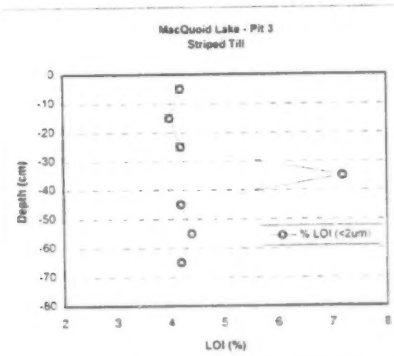












Pit 3 (<0.063mm fraction) (n =7)

Variable	Depth (cm)	Al (%)	As (ppm)	Ba (ppm)	Ca (%)	Co (ppm)	Cr (ppm)	Cu (ppm)	Fe (%)	K (%)	Mg (%)	Mn (ppm)	Ni (ppm)	P (ppm)	Pb (ppm)	Sr (ppm)	Ti (%)	V (ppm)	Zn (ppm)	% LOI	2-0.063mm	0.063-0.002mm	< 0.002mm	<0.63mm	0.002/0.063%
Depth (cm)	1.00																								
Al (%) <63um	0.18	1.00																							
As (ppm) <63um	0.12	0.87	1.00																						
Ba (ppm) <63um	-0.45	0.05	0.74	1.00																					
Ca (%) <63um	0.09	0.40	0.64	0.15	1.00																				
Co (ppm) <63um	0.27	0.88	0.68	0.90	0.15	1.00																			
Cr (ppm) <63um	0.30	0.99	0.80	0.88	0.27	0.91	1.00																		
Cu (ppm) <63um	0.41	0.93	0.71	0.97	0.04	0.97	0.96	1.00																	
Fe (%) <63um	0.27	0.98	0.80	0.98	0.30	0.98	0.99	0.96	1.00																
K (%) <63um	0.18	1.00	0.86	0.95	0.37	0.98	0.99	0.94	0.99	1.00															
Mg (%) <63um	0.36	0.97	0.80	0.99	0.21	0.98	0.99	0.98	0.99	0.98	1.00														
Mn (ppm) <63um	0.20	0.42	0.40	0.41	0.31	0.53	0.39	0.31	0.39	0.38	0.38	1.00													
Ni (ppm) <63um	0.29	0.95	0.80	0.96	0.24	0.82	0.97	0.94	0.98	0.95	0.98	0.21	1.00												
P (ppm) <63um	0.47	-0.77	0.60	0.90	0.12	0.79	0.85	0.83	0.86	0.79	0.89	0.11	0.81	1.00											
Pb (ppm) <63um	0.32	0.63	0.50	0.30	0.14	0.30	0.29	0.45	0.44	0.42	0.42	0.63	0.28	0.17	1.00										
Sr (ppm) <63um	0.38	0.61	0.74	0.38	0.95	0.35	0.49	0.28	0.51	0.57	0.43	0.53	0.42	0.05	0.32	1.00									
Ti (%) <63um	0.51	0.02	0.21	0.19	0.77	0.00	0.10	0.32	0.10	0.03	0.17	0.57	0.23	0.49	0.08	0.75	1.00								
V (ppm) <63um	0.14	0.99	0.91	0.92	0.46	0.83	0.96	0.90	0.97	0.99	0.95	0.44	0.93	0.73	0.52	0.66	0.06	1.00							
Zn (ppm) <63um	0.46	0.94	0.73	0.93	0.09	0.90	0.88	0.99	0.97	0.94	0.99	0.38	0.96	0.91	0.42	0.33	0.25	0.91	1.00						
% LOI	0.03	0.89	0.81	0.83	0.28	0.70	0.88	0.80	0.90	0.91	0.89	0.30	0.92	0.80	0.29	0.39	0.28	0.89	0.64	1.00					
2mm-0.063mm	0.71	0.69	0.35	0.83	0.10	0.57	0.76	0.78	0.72	0.68	0.77	0.18	0.78	0.74	0.22	0.12	0.39	0.64	0.81	0.59	1.00				
0.063mm-0.002mm	0.65	0.70	0.36	0.82	0.06	0.55	0.77	0.78	0.72	0.66	0.77	0.12	0.79	0.73	0.18	0.14	0.39	0.65	0.80	0.62	1.00	1.00			
< 0.002mm	0.89	0.58	0.27	0.79	0.27	0.61	0.68	0.74	0.66	0.58	0.72	0.41	0.66	0.72	0.37	0.01	0.37	0.55	0.78	0.40	0.92	0.88	1.00		
<0.063mm	0.71	0.69	0.35	0.83	0.10	0.57	0.76	0.78	0.72	0.68	0.77	0.18	0.78	0.74	0.22	0.12	0.39	0.64	0.81	0.59	1.00	1.00	0.92	1.00	
%-0.002/0.063	0.91	0.53	0.23	0.74	0.32	0.61	0.82	0.69	0.60	0.51	0.66	0.51	0.58	0.68	0.41	0.05	0.32	0.48	0.74	0.30	0.82	0.77	0.98	0.82	1.00

Pit 3 (<0.002mm fraction)

Variable	Depth (cm)	Al (%)	As (ppm)	Ba (ppm)	Ca (%)	Co (ppm)	Cr (ppm)	Cu (ppm)	Fe (%)	K (%)	Mg (%)	Mn (ppm)	Ni (ppm)	P (ppm)	Pb (ppm)	Sr (ppm)	Ti (%)	V (ppm)	Zn (ppm)	% LOI	2 - 0.063mm	0.063 - 0.002mm	< 0.002mm	<0.063mm
Depth (cm)	1.00																							
Al (%) <2um	0.03	1.00																						
As (ppm) <2um	0.47	0.45	1.00																					
Ba (ppm) <2um	0.88	0.79	0.68	1.00																				
Ca (%) <2um	0.34	0.08	0.63	0.50	1.00																			
Co (ppm) <2um	0.20	0.06	0.21	0.29	0.88	1.00																		
Cr (ppm) <2um	0.09	0.99	0.35	0.70	0.03	0.14	1.00																	
Cu (ppm) <2um	0.53	0.78	0.34	0.66	0.29	0.55	0.83	1.00																
Fe (%) <2um	0.45	0.16	0.38	0.47	0.87	0.99	0.08	0.23	1.00															
K (%) <2um	0.03	0.99	0.45	0.79	0.08	0.03	0.97	0.73	0.13	1.00														
Mg (%) <2um	0.07	0.89	0.58	0.80	0.35	0.14	0.86	0.73	0.46	0.84	1.00													
Mn (ppm) <2um	0.71	0.48	0.43	0.64	0.80	0.79	0.41	0.63	0.92	0.46	0.70	1.00												
Ni (ppm) <2um	0.07	0.78	0.66	0.63	0.15	0.13	0.80	0.80	0.03	0.73	0.72	0.26	1.00											
P (ppm) <2um	0.59	0.34	0.34	0.53	0.81	0.82	0.23	0.68	0.96	0.32	0.62	0.98	0.12	1.00										
Pb (ppm) <2um	0.09	0.32	0.64	0.59	0.74	0.62	0.24	0.07	0.81	0.26	0.67	0.09	0.11	0.52	1.00									
Sr (ppm) <2um	0.66	0.61	0.24	0.06	0.56	0.45	0.70	0.60	0.43	0.63	0.28	0.14	0.47	0.26	0.40	1.00								
Ti (%) <2um	0.79	0.71	0.58	0.85	0.58	0.37	0.66	0.52	0.68	0.65	0.91	0.78	0.84	0.72	0.77	0.00	1.00							
V (ppm) <2um	0.30	0.04	0.21	0.37	0.88	0.96	0.13	0.49	0.95	0.04	0.21	0.81	0.17	0.86	0.74	0.56	0.49	1.00						
Zn (ppm) <2um	0.85	0.98	0.69	0.71	0.24	0.05	0.88	0.75	0.36	0.85	0.99	0.63	0.85	0.86	0.65	0.33	0.84	0.14	1.00					
% LOI (<2um)	0.05	0.39	0.19	0.18	0.02	0.24	0.17	0.39	0.11	0.13	0.45	0.19	0.05	0.23	0.56	0.21	0.32	0.05	0.54	1.00				
2mm-0.063mm	0.71	0.62	0.67	0.80	0.59	0.45	0.55	0.42	0.75	0.50	0.89	0.84	0.53	0.81	0.89	0.17	0.96	0.56	0.83	0.46	1.00			
0.063mm-0.002mm	0.65	0.58	0.69	0.78	0.69	0.42	0.50	0.41	0.73	0.51	0.86	0.81	0.50	0.78	0.90	0.23	0.94	0.54	0.81	0.51	1.00	1.00		
< 0.002mm	0.89	0.78	0.52	0.81	0.63	0.53	0.71	0.42	0.75	0.73	0.91	0.90	0.60	0.84	0.78	0.12	0.94	0.56	0.85	0.23	0.92	0.88	1.00	
<0.063mm	0.71	0.62	0.67	0.80	0.59	0.45	0.55	0.42	0.75	0.56	0.89	0.84	0.53	0.81	0.89	0.17	0.96	0.56	0.83	0.46	1.00	1.00	0.92	1.00

Appendix 13
Lithological maps - Regional Sediment Samples

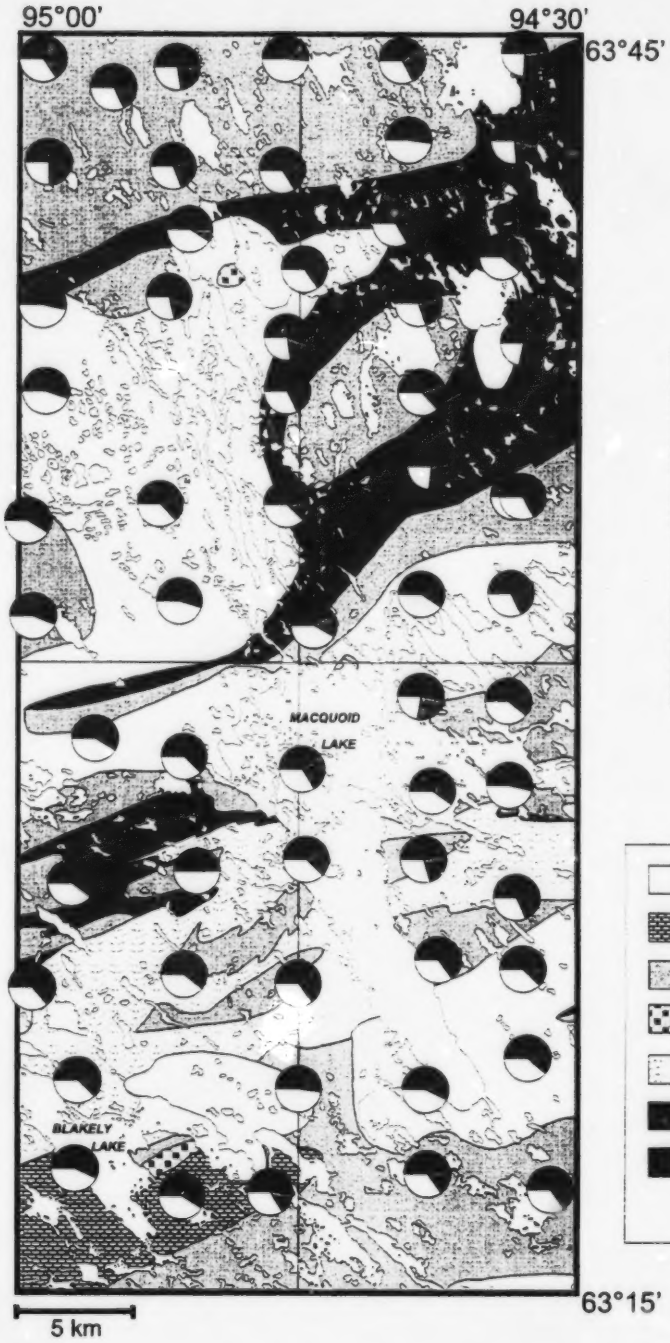
a) Relative proportion of dominant lithological classes

b) Relative proportion of Dubawnt Lithologies
- Arkosic Sandstone
- Volcanic Rocks

c) Relative proportion of Greenstone Belt Lithologies
- Metavolcanic Rocks
- Metasedimentary Rocks

d) Relative proportion of Plutonic Lithologies

TILL PEBBLE LITHOLOGIES
MACQUOID LAKE AREA (55M/7 AND M/10)



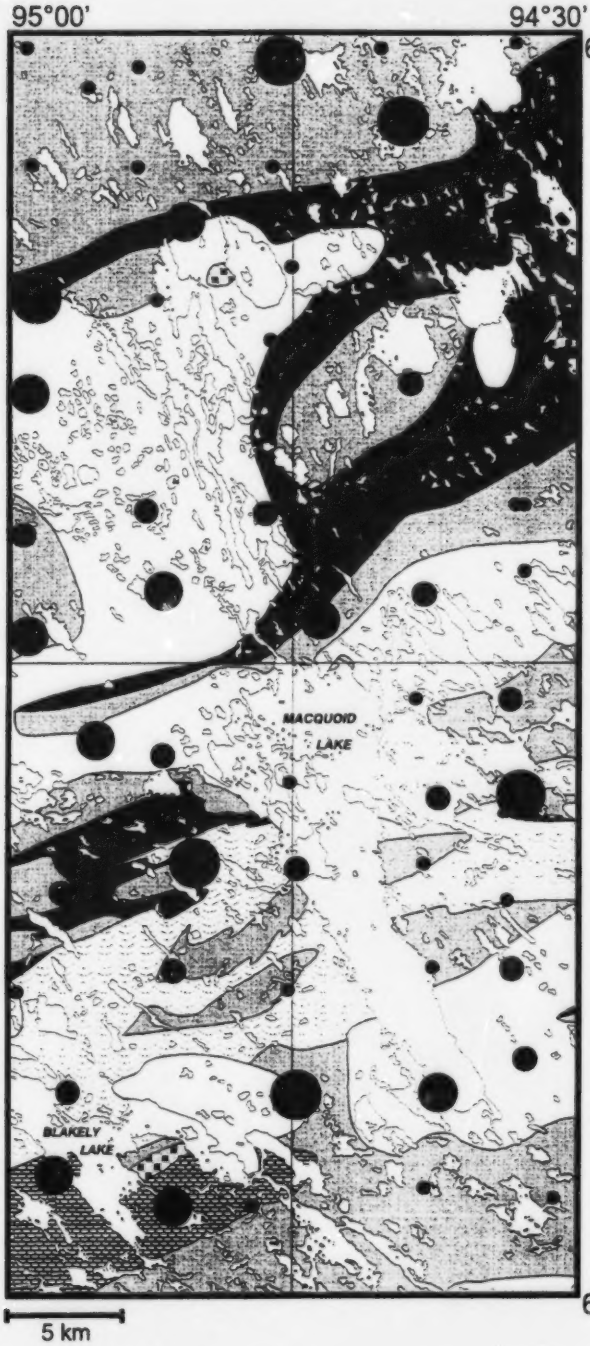
Pebble Litnologies
(4-8mm fraction)

% Dubawnt
% Greenstone
% Plutonic

Glacial Deposits
Orthogneiss
Granitoid Rocks; quartz diorite, granite
Gabbro
Metasedimentary Rocks
Metavolcanic Rocks; basalt to andesite
Metavolcanic Rocks; intermediate to felsic

Generalized from Tella *et al.*, 1997b

DISTRIBUTION OF DUBAWNT LITHOLOGIES (TOTAL)
MACQUOID LAKE AREA (55M/7 AND M/10)

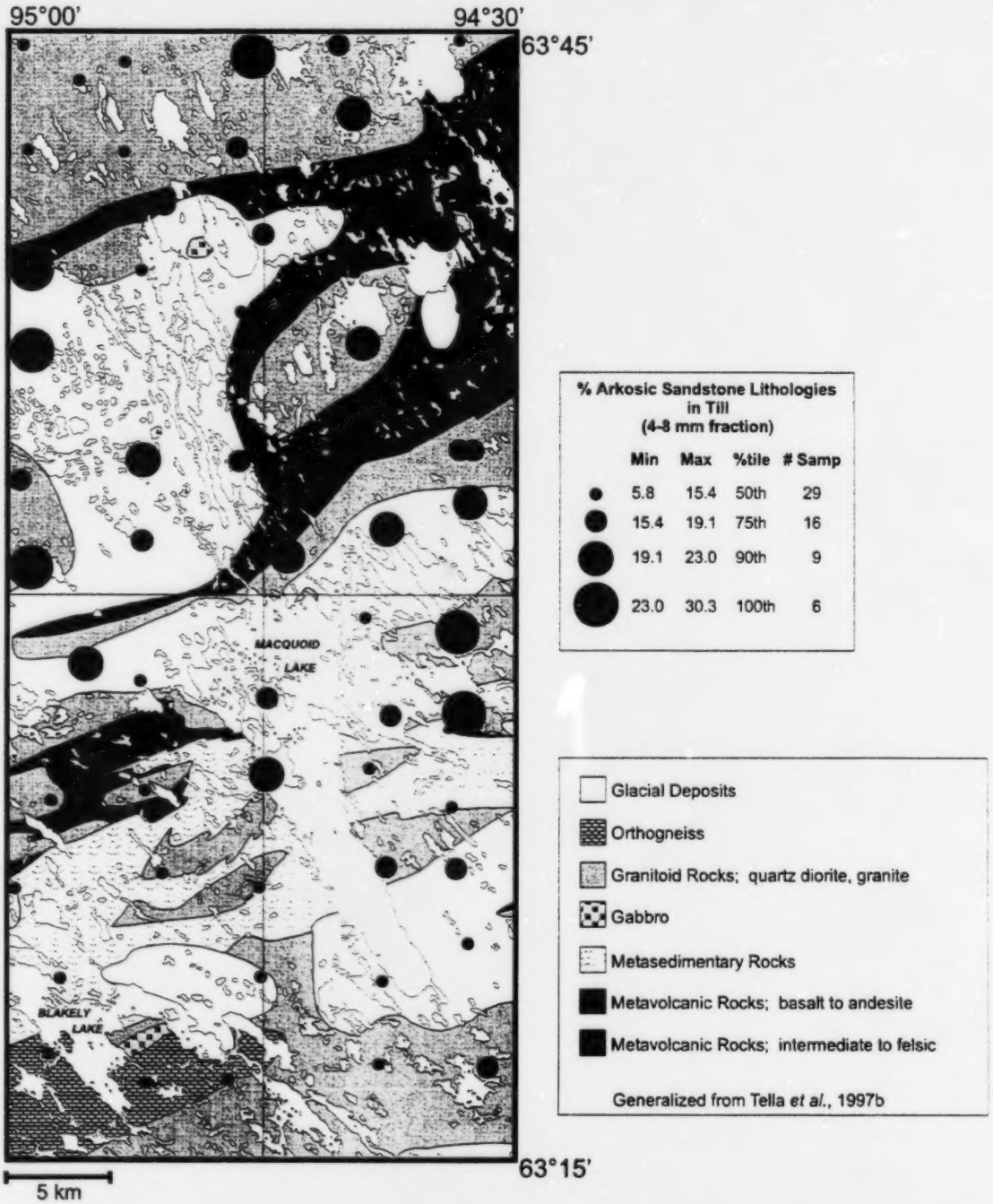


% Dubawnt Lithologies in Till (4-8 mm fraction)	Min	Max	%tile	# Samp
●	21.5	36.5	50th	30
●	36.5	41.2	75th	15
●	41.2	45.4	90th	9
●	45.4	50.3	100th	6

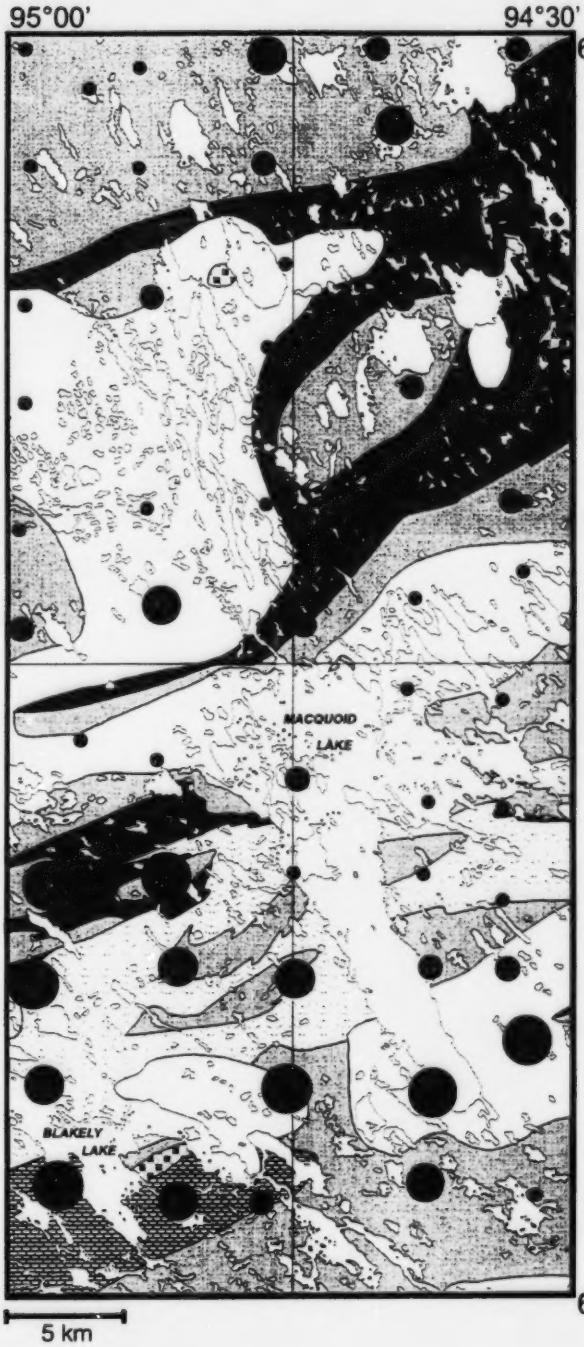
- Glacial Deposits
- Orthogneiss
- Granitoid Rocks; quartz diorite, granite
- Gabbro
- Metasedimentary Rocks
- Metavolcanic Rocks; basalt to andesite
- Metavolcanic Rocks; intermediate to felsic

Generalized from Tella *et al.*, 1997b

DISTRIBUTION OF DUBAWNT ARKOSIC SANDSTONE LITHOLOGIES MACQUOID LAKE AREA (55M/7 AND M/10)



DISTRIBUTION OF DUBAWNT VOLCANIC LITHOLOGIES MACQUOID LAKE AREA (55M/7 AND M/10)

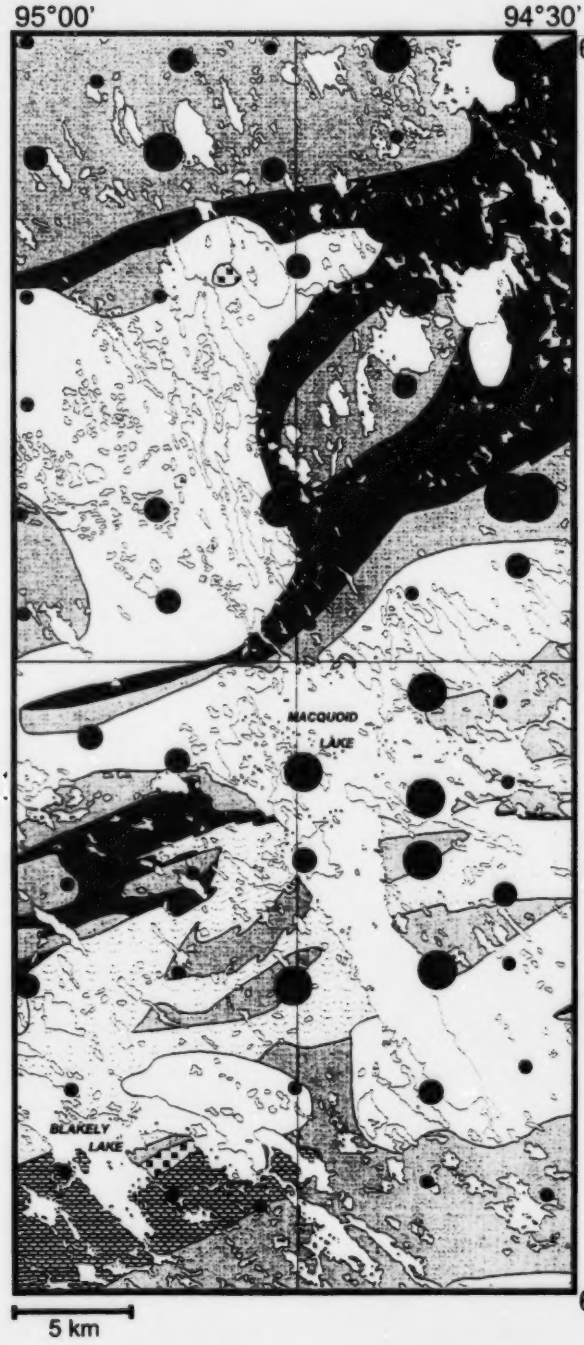


% Volcanic Lithologies in Till (4-8 mm fraction)	Min	Max	%tile	# Samp
●	5.6	11.9	50th	30
●	11.9	14.1	75th	15
●	14.1	18.4	90th	8
●	18.4	27.3	100th	7

- Glacial Deposits
- Orthogneiss
- Granitoid Rocks; quartz diorite, granite
- Gabbro
- Metasedimentary Rocks
- Metavolcanic Rocks; basalt to andesite
- Metavolcanic Rocks; intermediate to felsic

Generalized from Tella *et al.*, 1997b

DISTRIBUTION OF GREENSTONE LITHOLOGIES (TOTAL)
MACQUOID LAKE AREA (55M/7 AND M/10)



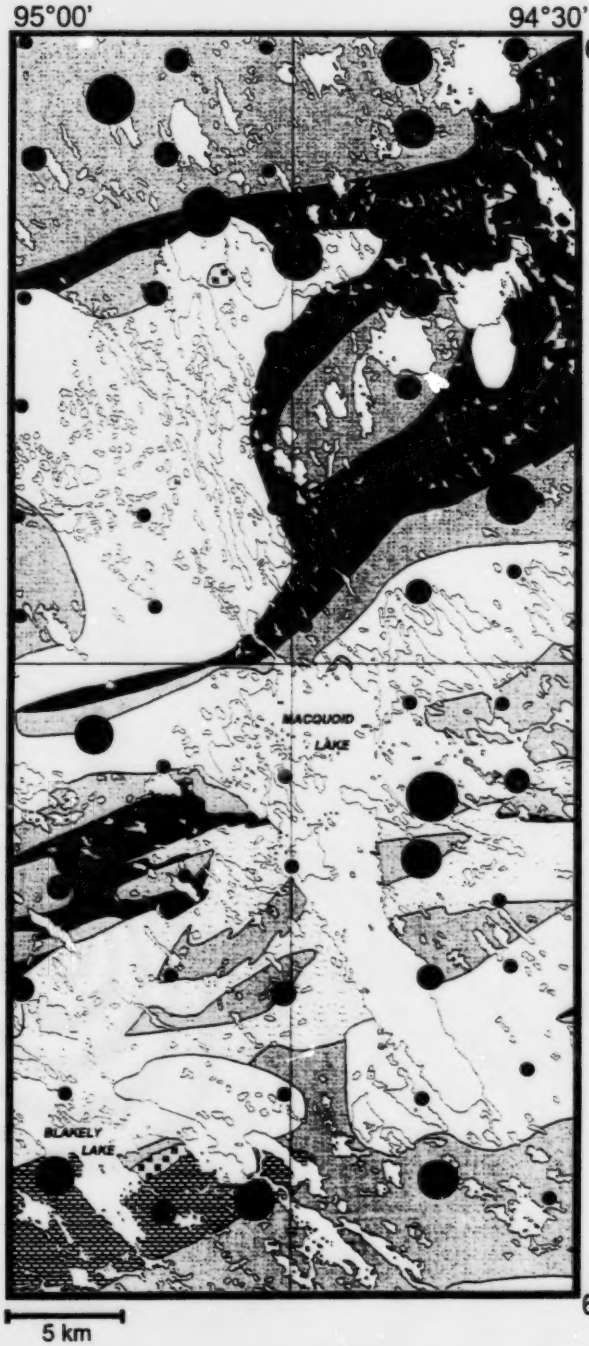
% Total Greenstone Lithologies in Till (4-8 mm fraction)

	Min	Max	%tile	# Samp
●	8.7	19.4	50th	30
●	19.4	22.4	75th	15
●	22.4	27.0	90th	10
●	27.0	33.5	100th	5

- Glacial Deposits
- Orthogneiss
- Granitoid Rocks; quartz diorite, granite
- Gabbro
- Metasedimentary Rocks
- Metavolcanic Rocks; basalt to andesite
- Metavolcanic Rocks; intermediate to felsic

Generalized from Tella *et al.*, 1997b

DISTRIBUTION OF METAVOLCANIC ROCKS
MACQUOID LAKE AREA (55M/7 AND M/10)



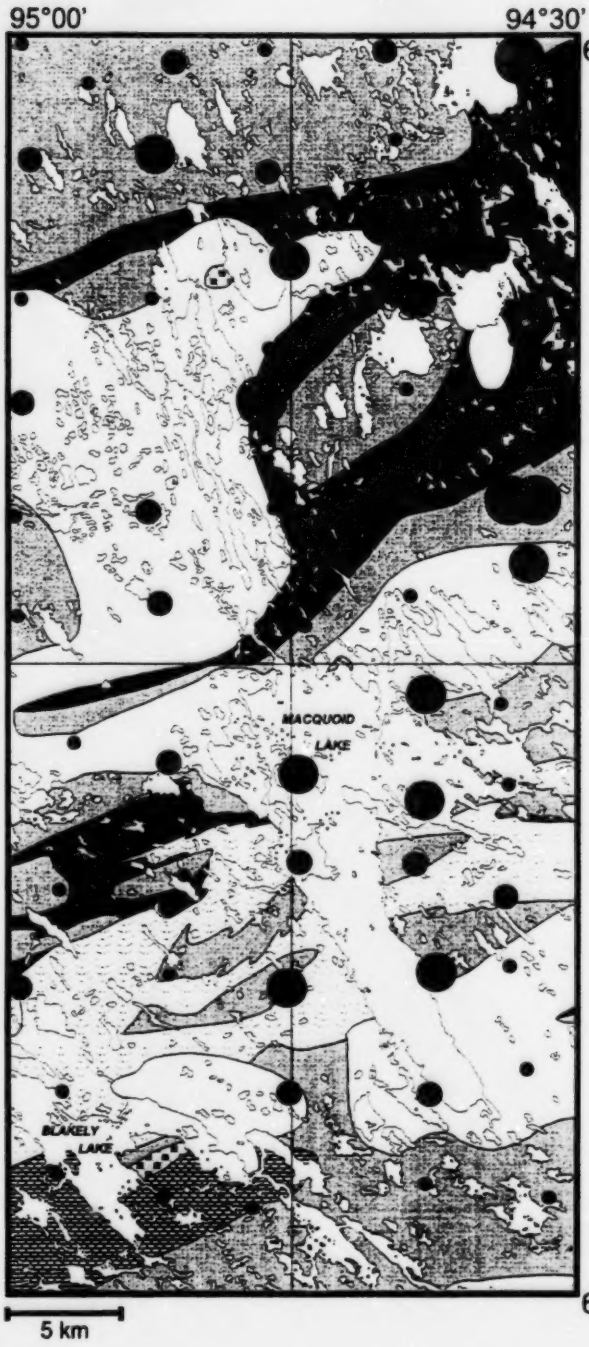
% Metavolcanic Rocks in Till (4-8 mm fraction)

	Min	Max	%tile	# Samp
●	0.1	2.7	50th	30
●	2.7	4.0	75th	14
●	4.0	4.7	90th	10
●	4.7	10.4	100th	6

- Glacial Deposits
- Orthogneiss
- Granitoid Rocks; quartz diorite, granite
- Gabbro
- Metasedimentary Rocks
- Metavolcanic Rocks; basalt to andesite
- Metavolcanic Rocks; intermediate to felsic

Generalized from Tella *et al.*, 1997b

DISTRIBUTION OF METASEDIMENTARY ROCKS
MACQUOID LAKE AREA (55M/7 AND M/10)



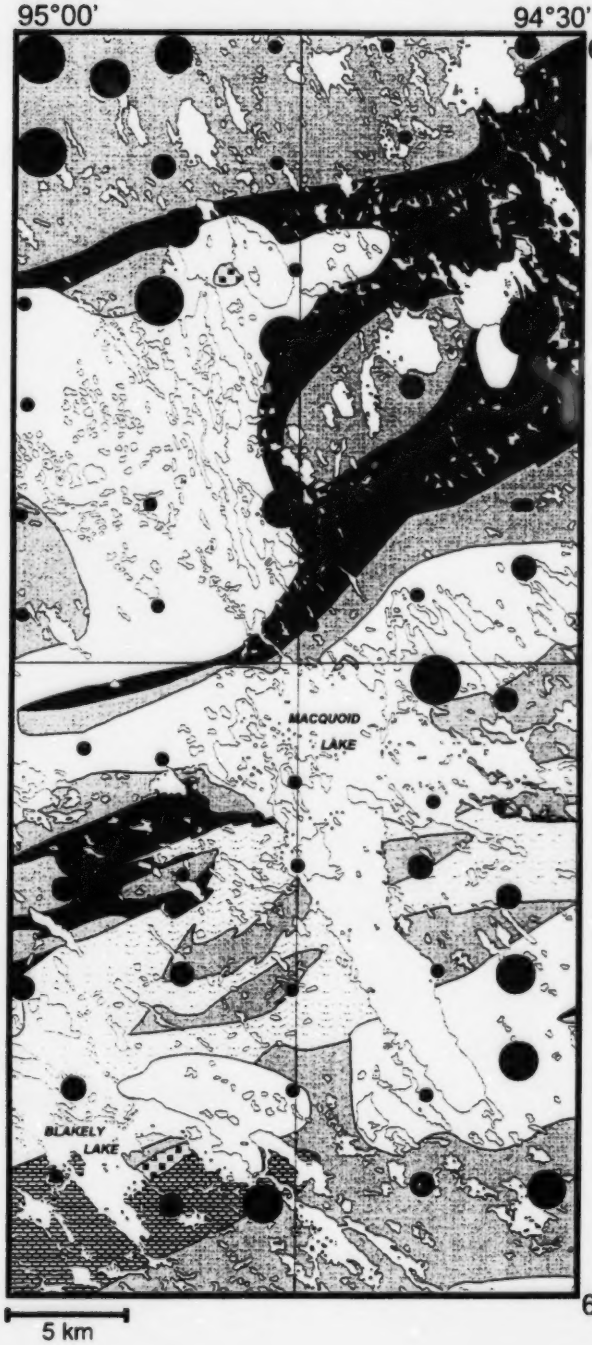
% Metasedimentary Rocks in Till (4-8 mm fraction)

	Min	Max	%tile	# Samp
●	3.1	16.3	50th	30
●	16.3	19.5	75th	15
●	19.5	23.3	90th	9
●	23.3	28.3	100th	6

- Glacial Deposits
- Orthogneiss
- Granitoid Rocks; quartz diorite, granite
- Gabbro
- Metasedimentary Rocks
- Metavolcanic Rocks; basalt to andesite
- Metavolcanic Rocks; intermediate to felsic

Generalized from Tella *et al.*, 1997b

DISTRIBUTION OF PLUTONIC LITHOLOGIES (TOTAL)
MACQUOID LAKE AREA (55M/7 AND M/10)



% Total Plutonic Lithologies in Till (4-8 mm fraction)

	Min	Max	%tile	# Samp
●	33.1	43.0	50th	30
●	43.0	48.3	75th	15
●	48.3	52.2	90th	9
●	52.2	62.1	100th	6

- Glacial Deposits
- Orthogneiss
- Granitoid Rocks; quartz diorite, granite
- Gabbro
- Metasedimentary Rocks
- Metavolcanic Rocks; basalt to andesite
- Metavolcanic Rocks; intermediate to felsic

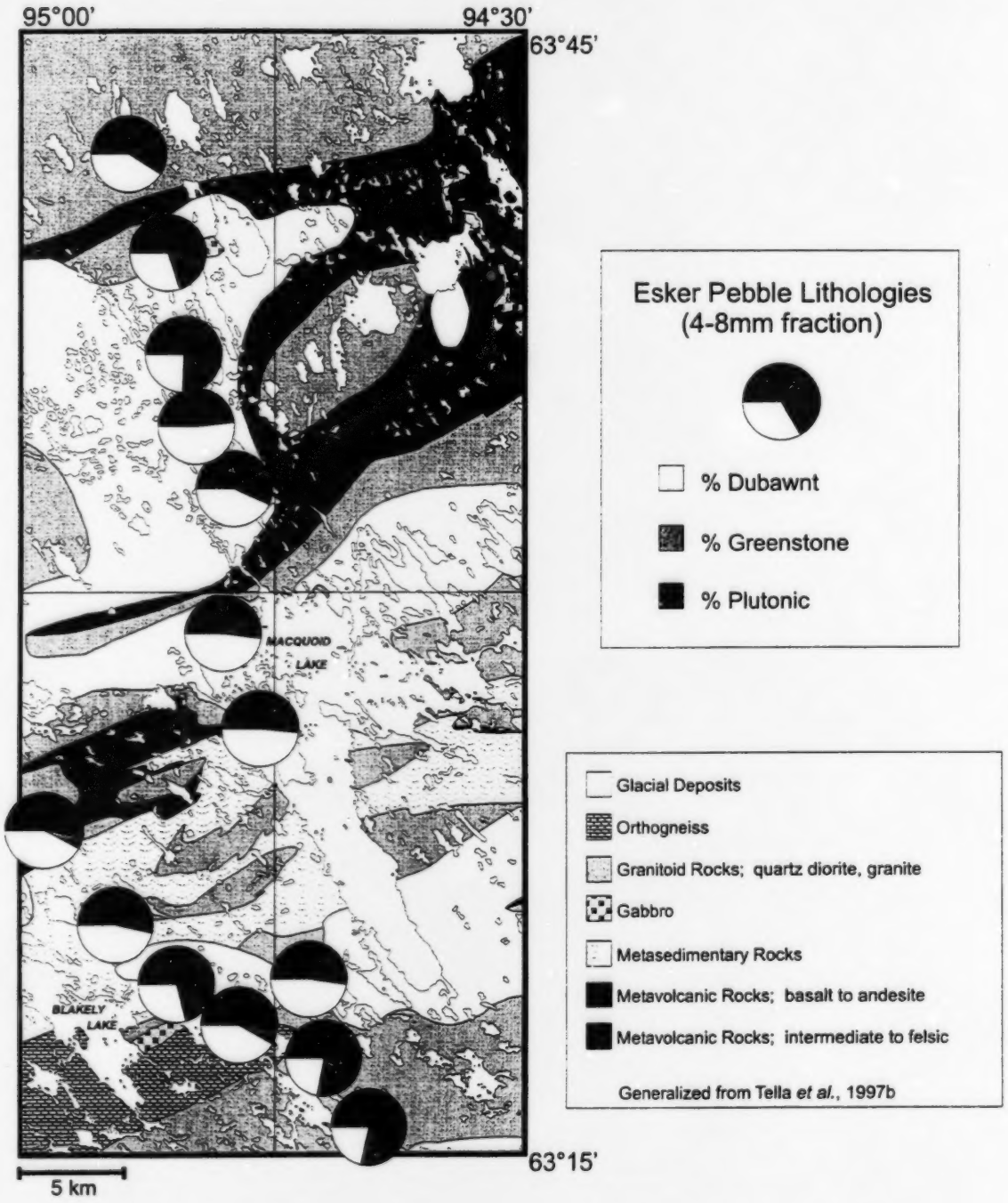
Generalized from Tella *et al.*, 1997b

Appendix 14
Lithological map - Esker Samples

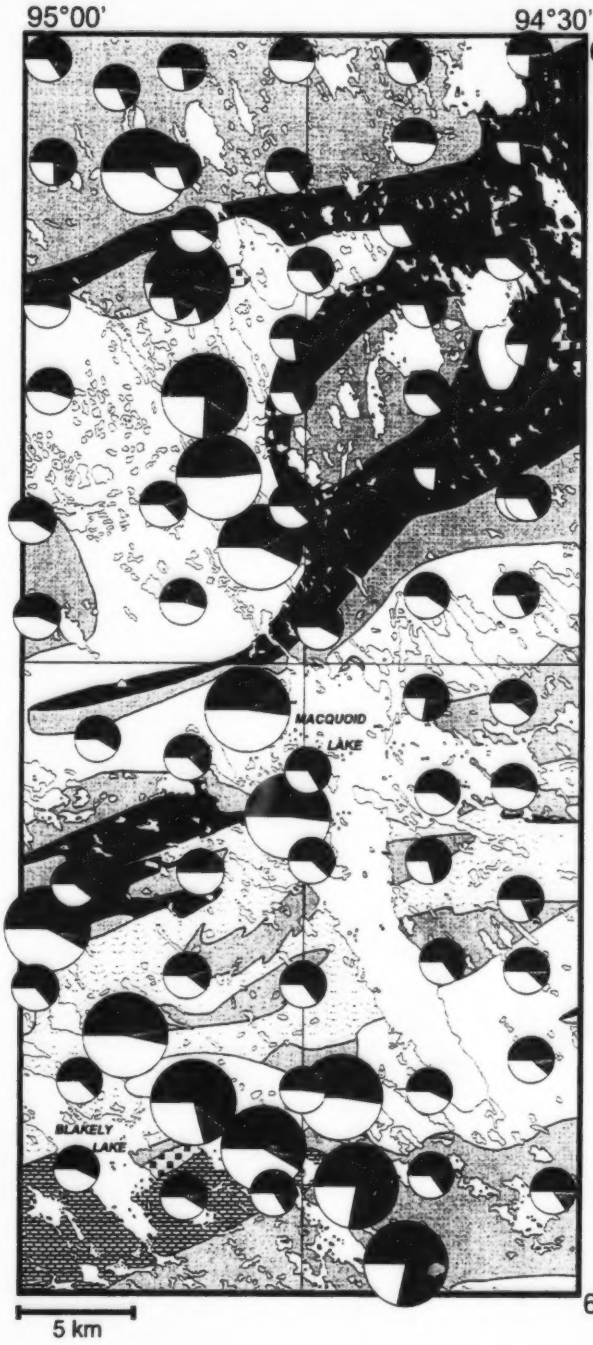
a) Relative proportion of dominant lithological classes

b) Relative proportion of lithological classes in esker and till samples

ESKER PEBBLE LITHOLOGIES
MACQUOID LAKE AREA (55M/7 AND M/10)



PEBBLE LITHOLOGIES
MACQUOID LAKE AREA (55M/7 AND M/10)



Pebble Lithologies
(4-8mm fraction)

- Till
- Esker
- % Dubawnt
- % Greenstone
- % Plutonic

- Glacial Deposits
- Orthogneiss
- Granitoid Rocks; quartz diorite, granite
- Gabbro
- Metasedimentary Rocks
- Metavolcanic Rocks; basalt to andesite
- Metavolcanic Rocks; intermediate to felsic

Generalized from Tella *et al.*, 1997b